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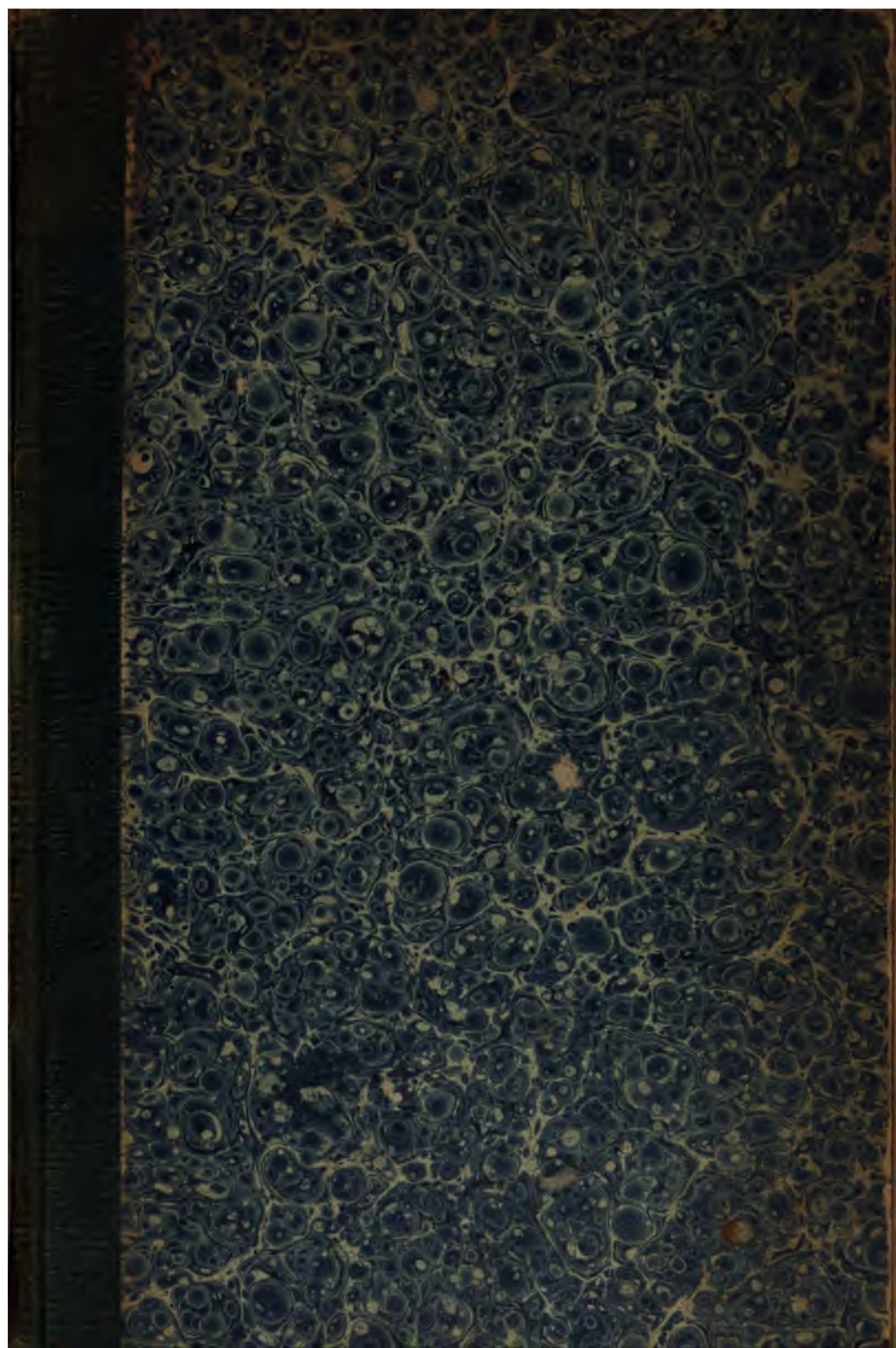
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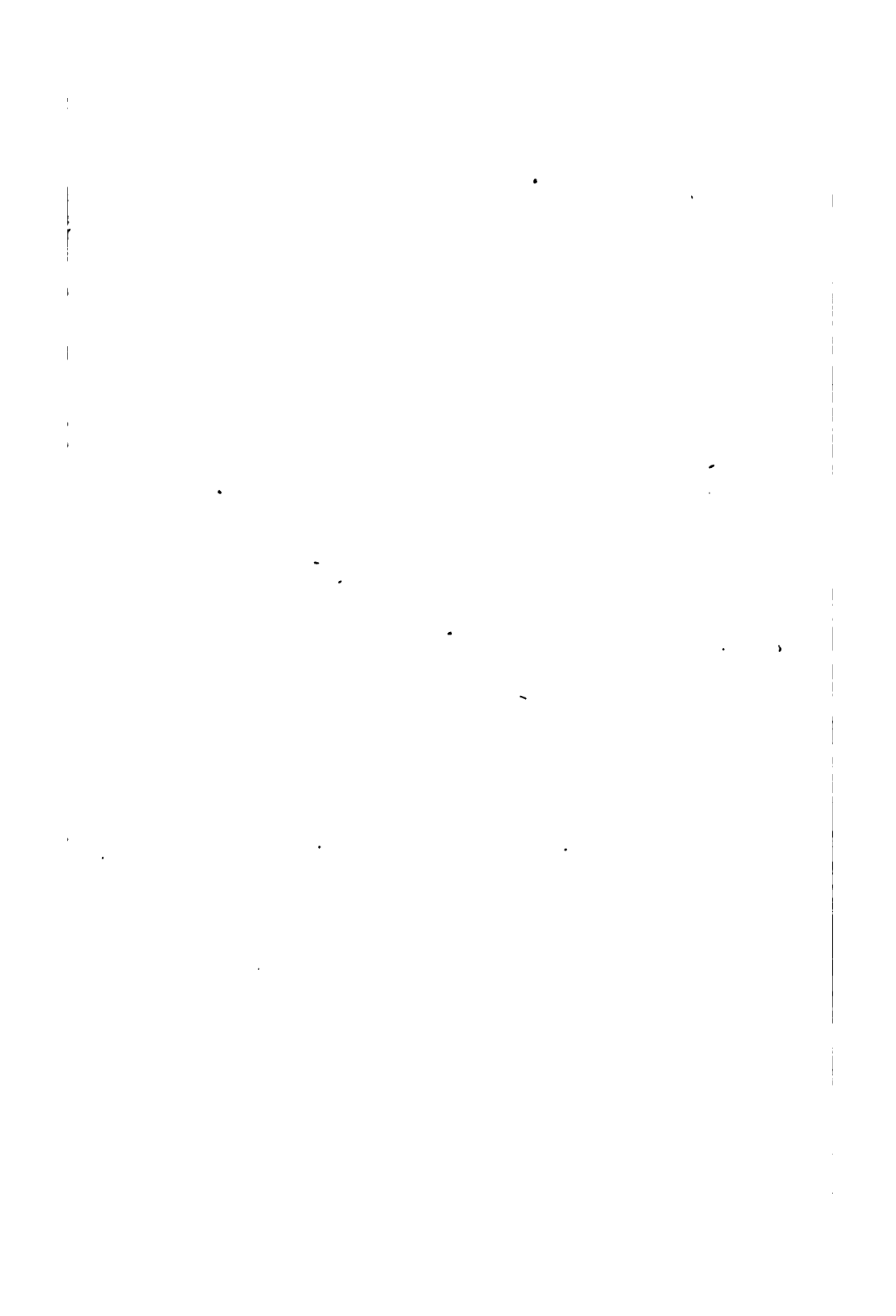
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REMARKS
ON
THOROUGH DRAINING
AND
DEEP PLOUGHING.

BY JAMES SMITH, ESQ.
OF DEANSTON WORKS, NEAR STIRLING.



EXTRACTED FROM
THE THIRD REPORT OF DRUMMOND'S AGRICULTURAL MUSEUM.

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"The most extraordinary agricultural improvement of modern times, is the system of Thorough Draining and Subsoil Ploughing of Mr Smith of Deanston."—*Loudon's Gardeners' Magazine*.

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AGRICULTURE.

ON THOROUGH DRAINING AND DEEP PLOUGHING.

BY JAMES SMITH, ESQ. OF DEANSTON WORKS.

IN the Messrs Drummond's Report of their Agricultural Exhibition, published in March 1838, the writer of this article contributed a paper on the subject of Thorough Draining and Deep Ploughing, which has received considerable attention, both from speculative and practical agriculturists, and has led to the introduction of the system there explained and advocated, in districts where it had not before been known, and in all instances with the most eminent success. This system, when applied with any degree of care, soon speaks so prominently for itself by its wonderful effects, that all assent to its excellence, and proprietors and tenants who have any spirit for improvement, follow out the practice as far as their means will allow.

The system, as explained in the paper alluded to, has generally been pretty clearly understood; but those unaccustomed to reckon by the Scotch acre, and the Scotch grain measure, have complained that it was somewhat difficult for them to understand, and some points in the detail of the plan of operations laid down, appear to want a more lucid exposition, which having been suggested to the writer, he has deemed it the best plan to go over the whole subject anew in the present paper, that he may introduce what the remarks of friends and his own farther experience have brought under his notice.

It is unnecessary here to go over that part of the former paper which treats of the history of the introduction of the thorough draining into Scotland, as the merits of the various introducers will be elsewhere more permanently recorded, and the extensive introduction of the system, within a few years, will be their best reward.

Various systems of draining had, from time to time, been in vogue, and although all of these have proved more or less bene-

ficial, according to the nature of the soil and substrata in which they were applied, still their success was various and uncertain, and much land was unavoidably left in a very wet and unproductive state.

Cutting off the springs by very deep cross drains was one system, and which is still advocated and practised by many intelligent men. Elkington introduced a mode which was much gone into at one period. The principle of his mode was to make perforations or bores, or to dig wells into the under strata, so that the water might pass from an impervious to an open stratum.

To those who know anything of the nature and structure of the superficial stratification of the crust of the earth in this country, this principle, must, of course, have appeared of very limited and uncertain application; nevertheless it was all the rage for a time, and much money was thrown away in its application, under circumstances not at all suited to the principle.

The portion of land wetted by water springing from below, bears but a very small proportion to that which is in a wet state, from the *retention* of the water which falls upon the surface in the state of rain, and a vast extent of the arable land of Scotland and England, generally esteemed dry, is yet so far injured by the tardy and imperfect escape of the water, especially in winter, and during long periods of wet weather in spring and summer, that the working of the land is often difficult and precarious, and its fertility much below what would uniformly exist under a state of thorough dryness. A system of drainage, therefore, generally applicable, and effecting *complete and uniform dryness*, is of the utmost importance to the agricultural interests, and, through them, to all the interests of the country. By the system here recommended this is attained, whilst the expense is moderate and the permanency greater than on any other system yet known.*

Those drains, as applied in the *Carse*,† have been named "Wedge Drains," from their form, and being filled with wedges, or keys, to preserve the opening in their bottoms. They are sometimes called *furrow drains*, from their being placed under the water furrows of the ridges; but these terms give no expo-

* In one hundred miles in length of drains executed on the farm of the writer within the last 18 years, not a single failure has yet been discovered.

† A term applied to the flat alluvial clay districts of Stirlingshire, Perthshire, &c.

sition of the *principle* upon which the effect of this mode of draining depends.

The principle of the system advocated in this paper is, *the providing of frequent opportunities for the water rising from below or falling on the surface, to pass freely and completely off*, and, therefore, the most appropriate appellation for it seems to be "*The Frequent Drain System*," or Thorough Drainage System.

In the natural circumstances of the soil on the surface of the earth, the drainage is extremely various, from that of the light dry loam incumbent on deep beds of open sand or gravel, to that of the thin sterile crust of soil incumbent on massive beds of impervious till. In the former, there is no water springing to the soil from below, and whatever falls upon the surface in the shape of rain, is instantly absorbed, and passes through the sand or gravel to some outlet at a lower level. In the latter case, on the contrary, water, whether springing from below or falling upon the surface in the shape of rain, must either run slowly off over the surface, however great the distance, or, in the event of a horizontal surface, must remain stagnant till evaporated by the sun, or absorbed by the atmosphere. On such a subsoil a sufficient depth of *active soil* can never be long maintained; for, even if trenched and enriched by lime and dung, it will bear but scanty and precarious crops; and, if laid out for pasture, will in a few years revert to its former thin crust, producing but the coarsest herbage. Some soils are incumbent on subsoils, partially or slowly pervious to water—such, by judicious management, produce sometimes good crops in favourable seasons; but, when much rain prevails, the crops are neither bulky nor of good quality. Soils so situated are unfit for wheat, as the alternate frosts and thaws of winter acting on the water in the soil, are sure to throw out the plants. When soil is immediately incumbent on open rock, especially on whin or green stone, which is very open from its many fissures, the land is uniformly fertile.

If, therefore, we observe carefully the operations of nature, we shall never be at a loss for principles to guide us in cultivation of the soil. In the last stated example the open rock under the soil affords frequent and pretty uniform channels of escape for the water; hence the obvious suggestion of the *frequent drain system*.

In proceeding to apply this system of drainage to a farm, the first object is to attain a sufficient fall or *level*, as it is commonly termed, for a main drain to receive the water flowing from the ordinary or parallel drains.

This drain should be directed along the bottom of the chief hollow or valley of the grounds, where the whole or greater portion of the drains can be led into it. If any lesser hollows occur in the field, they must also have their proportional mains or leaders.

The bottom of the main drain should be at least 3 feet, and, if possible, $3\frac{1}{2}$ or 4 feet under the surface where it passes along; and it should have throughout as uniform a fall as the nature of the ground will admit.

It should be flagged in the bottom, or where flagstones are expensive, built as an inverted arch, to prevent the possibility of washing away under the side building. The dimensions necessary will depend on the fall or declivity, and the area of land from which it has to receive water. With a fall in no place less than one foot in 100 yards, a drain 10 inches wide, and 12 inches deep, will void the rain water from 100 acres.* It is of great importance to make the open area of such drains narrow and high, as smaller bottoms and covers will suit, and be less liable to give way; and the current of water being more confined, mud and sand will be less apt to settle in the bottom. Let the sides be smoothly and securely built with flat stones, either with or without mortar; and let strong flat covers be placed over (see fig. 1), or, where such are not to be found, rough, simple arches may be built with thin stones and mortar for the bottom and cover (as shown, fig. 2), packing the haunches of the arch well up to the sides of the cut. Where lesser hollows occur crossing the fields, it is necessary to cut submains along their bottoms about 3 or $3\frac{1}{2}$ feet deep, and having openings of suitable dimensions formed by inverted stone couples, or with drain-tiles, or, where a very large flow

* People frequently complain that they cannot find a sufficient fall or *level*, as they sometimes term it, to carry off the water from their drains. There are few situations where a sufficient fall cannot be found, if due pains were exercised. It has been proved in practice, that a water course 30 feet wide and 6 feet deep, giving a transverse sectional area of 180-square feet, will discharge 300 cubic yards of water per minute, and will flow at the rate of one mile per hour, with a fall of no more than 6 inches per mile

of water has to be provided for, with an inverted tile, and a covering tile placed above the bottom one, or with larger tiles made on purpose. (See figures 3, 4, 5, and 6.)

There should be a cross submain at the bottom of every field or stretch of drains, to receive the water from all the parallel drains, and such drain should always be cut six inches deeper than the drains running into it, that the water may have a free drop, which will prevent the lodgment of mud or sand at their junctions or mouths. (See fig. 6.) *Open cuts or ditches*, either as mains or submains, should never, except from necessity, be adopted, being apt to get filled with mud and grass, by which water is thrown back into the drains, which often chokes them ; besides the loss of land, annoyance in ploughing, constant expense of cleaning, and the unsightly appearance of the thing, are serious objections ; and where hedge fences are used, the nourishment which might be derived by the extending of the roots into the adjoining field, is completely cut off on one side.

Having thus provided a main drain, with submains flowing into it, matters are prepared for setting off and executing the parallel frequent drains in the body of the field. The drains can be executed at any season when the weather will permit ; but the spring and summer are most suitable for the work. It is best to execute the drains when the field is in grass, as it can then be done in all weathers in a more cleanly manner.

In laying off the drains, the first object for consideration is, the nature of the subsoil. If it consists of a stiff strong till, or a dead sandy clay, then the distance from drain to drain should not exceed from 10 to 15 feet ; if a lighter and more porous subsoil, a distance of from 18 to 24 feet will be close enough, and in very open subsoils, 40 feet distance may be sufficient. When the ridges of the field have been formerly much raised, it suits very well to run a drain up every furrow, which saves some depth of cutting. The *feering** being thereafter made over the drains, the hollow is filled up, and the general surface ultimately becomes level. When the field is again ridged, the drains may be kept in the crowns or middle of the ridges, but if it is intended to work the field so as to alternate the crowns and furrows, then the ridges should be of a breadth equal to *double* the distance from drain to drain, and by setting off the

* A Scotch term for the first furrow in breaking.

furrows in the middle betwixt two drains, the crowns will be in a similar position, so that when the furrows take the place of the crowns they will still be in the middle betwixt two drains, which will prevent the risk of surface water getting access to the drain from the water furrows by any direct opening. It is, however, preferable to work thorough drained fields without ridges, preserving a uniform surface, so that the water falling on the surface shall percolate from where it falls to the drains, and all currents of water and consequent washing or running of the surface is avoided ; besides, the crop will be more uniform and less liable to lodge, and will give a higher average return. The handsome appearance of the fields in grain or in grass is very gratifying.

Some farmers object to the want of ridges as causing difficulty in sowing and reaping. A slight rut with a single horse plough serves to regulate the sower ; but when the sowing machine is used, no marking is necessary, and the small inconvenience in reaping is far overbalanced by the many advantages. Besides, it is probable that the reaping machine will, ere long, become a powerful auxiliary implement of the harvest, and be in the hands of every extensive and good farmer.* The absence of ridges, and the presence of a uniform and smooth surface, will tend much to facilitate its application, for furrows and gathered ridges have hitherto been its chief obstructions. At whatever distances the drains are placed, they should be run parallel to the ridges, which is commonly in the steepest descent. The drains should be run parallel to each other, and at regular distances, and should be carried throughout the whole field, without reference to the wet or dry appearance of portions of the field, as *uniform and complete dryness* is the object ; and portions of the land, which may be considered dry in their natural state, will appear wet when compared with those parts which have been properly drained.

A three feet drain should be carried along the ends of these drains at the top of the field, and at a distance of about 9 feet from the fence, especially if it is a hedge fence. Such a drain is necessary for the growth of the hedge, and to render the

* The writer reaped the whole of his crop of 1837 with his reaping machine, excepting one field of heavy oats, which was much laid ; the machine cutting at the rate of one statute acre per hour, and the whole cost, including a full charge for the tear and wear of the machine, being 5s. 6d. per acre.

TRANSVERSE SECTION OF DRAINS

Fig. 1
Flagged Main



Fig. 2
Arched Main



Fig. 3

Fig. 4

Fig. 5

Fig. 6

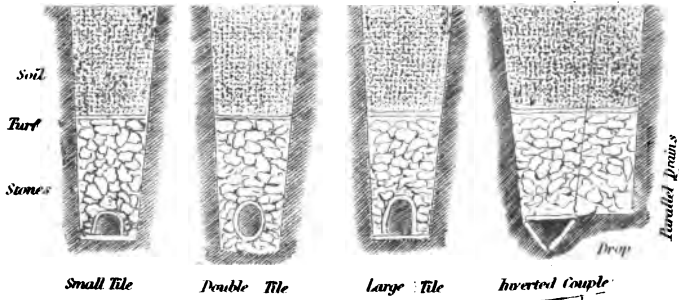


Fig. 7



Fig. 8

Fig. 9

Fig. 10

Fig. 11

Fig. 12



end ridges, where there is much carting and turning, completely dry; but if made nearer than 9 feet, the roots of the hedge are apt to get into the drain, and choke it up by degrees.

It is of importance to be accurate in laying off the drains as described, as it secures uniformity of dryness, and in all future operations, or at any time, it is easy to ascertain the line of any drain. Some people are still prone to the practice of throwing in a cross drain, or to branches going off at right angles, which is of no farther avail in drying the land, whilst it increases the length of drain without a proportionate increase of the area drained.

It may prove of great use, in after times, to have a plan of each field, with the lining of the parallel drains and main drains accurately laid down, and the lengths and distances marked in figures, to remain as a reference.

It has been pretty generally believed and argued, that drains laid off in this manner on a steep, will not be so effectual in catching water, but this notion can be shown to be erroneous. Drains drawn across a steep, cut the strata or layers of subsoil transversely, and as the stratification generally lies in sheets at an angle to the surface, it will be seen, on reference to fig. 7, that the water passing in or between the strata, immediately below the bottom of one drain, nearly comes to the surface before reaching the next lower drain, as at *a a a*. But as water seeks the lowest level in all directions, if the strata be cut longitudinally by a drain directed down the steep, the bottom of which cuts each stratum to the same distance from the surface, as represented in fig. 7, by the line *b b b*, the water will flow into the drain at the intersecting point of each sheet or layer, on a level with the bottom of the drain, leaving one uniform depth of dry soil.

This applies alike to water flowing from below or falling on the surface; the truth of this has been practically proved on a large scale, in soils of various natures, where spouty banks have been completely dried without a single cross drain. It does sometimes happen that there exists what is called an "eye-spring," arising from some accidental tubular opening in the substratum. In such case it may be necessary to run a small branch drain, from the nearest parallel drain, into the eye of the spring. This, however, is of rare occurrence.

A very important advantage of having the drains down the steep, is the prevention of any lodgment of mud or sand, the current having force from the declivity to carry them along to the main drain ; besides, in the event of any accident choking a drain, the water will either, by its altitudinal pressure, force through the obstruction, or, by bursting out at the surface, will show very nearly the spot where the evil exists. Whereas cross drains, having little declivity, are often filled high up with water for years before the insidious cause of mischief is discovered.

It has lately been asserted that drains so placed are apt to burst out, or *blow*, as it is sometimes termed. This can only take place when the drains have been executed in an imperfect manner, whereby an obstruction of the flow of water is caused ; for a well executed drain will void more water running down the steep than if across, and so much rain water cannot at any time fall as to fill up the open area of interstice of the broken stones.

It is quite necessary to fill drains directed down the steep with stones of a small size—say $2\frac{1}{4}$ inches in diameter—or with danders or gravel, to prevent the current of water from cutting or running the bottom of the drains.

The filling of drains with small-sized material is in other respects preferable—no pressure will crush it, so as to fill up the interstices where the water flows—the sides of the drain are more closely and uniformly pressed, which prevents falling in or wasting—no moles, rats, mice, or other such vermin, can make way into the drains, or force such a quantity of earth in from the sides as to stop the flow of water,—besides, material for such is more generally and easily found, and the execution is cheaper, unless the masses, from which the stones have to be broken are very large. By collecting from the surface of the fields, all stones not larger than a hen's egg, as many can be found in most dry-field situations as will serve to drain completely a field of equal extent. These smaller stones require no breaking, and being gathered by women and children cost very much less. It has been plausibly maintained by some theorists, that small materials filling a drain, will be apt to catch earthy matter from the water flowing along, and become, in a few years, a dense mass of stony earth, altogether

ceasing to form a drain. Without meeting this objection by a train of reasoning, which could be satisfactorily done, it may be quite sufficient to state, as fact, from experience, that such result does not take place.*

Indeed, the water passing into the drains, by filtration, being perfectly pure, has no sediment to deposit; for, even during the heaviest rains, the water passing from a properly made drain, has merely a slight milky tinge. Tiles for such drains are very expensive, costing more for tiles alone, in most circumstances, than the whole cost of a broken stone drain; besides, they are precarious as to durability, as one tile yielding may stop a great length of drain.†

There are situations, however, where, from the want of stony materials, tiles must be resorted to. It is generally in flat carse lands where tiles are used; also in districts of extensive fields of clay, with a scanty supply of stones. Fig. 8 represents a transverse section of the tiles commonly used, *a* being the covering tile, 4 inches wide, and 6 inches deep, *b* the sole or bottom tile. In hard bottomed land the sole tile is unnecessary. The tiles are generally from 12 to 14 inches long; they are sold by the maker at from 30s. to 35s. per thousand, and, where soles are included, about 50s. per thousand; but I have been assured by an intelligent gentleman, that he can furnish them in his own ground, where coals cost 4s. per ton, at 14s. per thousand, and with soles at 21s. per thousand, not including any charge for implements, &c. necessary in the manufacture, such as a clay mill, drying sheds, and a burning kiln; but these are not very expensive, and will last for many years with little repair, and one such establishment will furnish tiles for a large district of country. When tiles are used it is not necessary to cut the drains so deep as where stones are to be used—24 inches is quite enough.—Mr M'Ewan of Blackdub, on the Blairdrummond Estate, near Stirling, has, with much

* The drains on the farm of the writer are looked into at various points every year, and no indication of filling up has yet been discovered, even in those of 18 years' standing.

† Since this article was originally written, the use of tiles in draining has greatly extended in all the clay districts, and such improvements have been made in the formation and burning of the tiles that little danger is to be apprehended from failure. The cost has also been greatly reduced, and from the introduction of machinery in the manufacture of tiles by the Marquis of Tweeddale and others, a still farther cheapening may be anticipated.

ingenuity and perseverance, perfected a plough, which, in carse land, throws out a furrow of from 16 to 18 inches deep, leaving 6 inches to be taken out with the spade for the seat of the tile. This he gets done, and the tile placed for 6d. per rood of 36 yards. The plough requires from 8 to 12 horses, and 7 men, who can execute with ease 324 roods of 36 yards per day—taking 12 horses at 4s. each, and 7 men at 2s., the amount will be 62s., being about 2d. per rood. Taking tiles at an average of 18 inches, and allowing for breakage, about 100 will lay a rood of 36 yards, which will make the cost of tiles furnished on the ground 1s. 5d. per rood; when flats or bottom tiles are used, they will cost in addition 8d., making in all 2s. 1d. for tiles and bottoms. But when tiles and bottoms are bought and carried, they will cost at least 6s. per rood. See page 26.

As much sandstone as will fill a rood with broken stones, say two cart loads, can be in most circumstances quarried, carted a mile, and broken to pass through a $2\frac{1}{2}$ inch ring for 3s. 6d. When flat thin stones can be procured, many people still make their drains with what is called a coupled bottom. Fig. 9 represents the common form of coupling. Fig. 10, the inverted couple, which is by far the most preferable, when couples are at all used.

Coupled drains are, however, objectionable, being very liable to occasional, if not frequent failures, admitting moles, rats, &c. to travel in them, and being more apt to allow the cutting of the bottoms of the drains in steep parts. Box drains are expensive, and liable to all the objections of coupled drains, with the additional fault of having a broad flat bottom, in which mud and sand are apt to accumulate and lodge—sometimes to the complete filling of the open area and the drains. (Fig. 11 shows a box drain.) In some parts of the country where thin bedded rock prevails, the bottom filling of the drains is frequently done by placing three or more stones on edge, side by side, as shown in fig. 12, having openings betwixt them for the water to pass; this mode may do very well, and under some circumstances may be cheaper, but I do not consider it so secure as broken stones, especially where the drain is on a steep, or where the bottom is soft. The broken stones constantly check any tendency to a rapid flow of the water, and in soft bottoms they press on many points, and fall in to fill any hole that may

eventually take place, and so prevent further mischief. Filling of drains with great irregular stones, some of them closing nearly the whole cross sectional area of what should be the open way of the drain, is too slovenly and absurd a practice to require any refutation. When the work is altogether done at the expense of the tenant, prudence or necessity will often lead to less expensive filling, such as using the stones larger, and fewer of them; but when permanency is wanted, the greater expense and care should always be incurred, as much of the permanency depends on careful filling with proper material.

The lines of drains having been marked off in the field, the drainer begins by cutting with a spade on a line, then removing a first spading of about 13 or 14 inches wide all along; another follows with a narrower and tapering spade made for the purpose, taking out another spading, and when picking becomes necessary, a third man follows with a pick, and a fourth with a large scoop-shovel to cast out the earth—a smaller scoop-shovel is used to clean out the bottom, which should be cut as narrow as will allow the last drainer a footing, generally about 3 or 4 inches. (See annexed plate of drains and implements.) From 2 to 2½ feet from the surface, are the best depths for such drains, the latter always to be preferred. The bottom should be cut as straight and uniform as possible, so that the water may flow freely along at all places, and it is better to cut a little deeper where there is any sudden rise of the surface, than to follow it; and where sudden hollows occur, the cutting may on the same principle be less deep; attention to this also admits of after straightening or levelling of the surface, without any injury to the drains. The workmen, in cutting, should throw the earth to the right and left from each alternate drain, as that allows the plough to go regularly and fully occupied *boutings*,* in filling in the earth, whilst each alternate ridge or space is left for getting in the stones, free from the earth thrown out. The stones may either be laid down at intervals by the sides of the drains, to be there broken, or being broken in masses at some convenient spot, and at such convenient seasons as best suit for the employment of spare labour, can be brought by the carts ready to be filled in. No stones should be filled in till the whole

* A Scotch term for a rotation or traverse of the plough.

line of drain has been cut out *and inspected*; but the sooner drains are completed after having been cut the better, and they should always be filled from the higher level downwards. Sometimes, when there is much tendency of the sides to fall in, it becomes necessary to fill in going along. Cutting in the summer, when there is little water in the soil, or in any dry season, saves much of this. In soft or sandy bottoms, by cutting the drains to half the depth in the first instance, and allowing them to remain so till the water has been voided from the upper stratum of the soil, the lower part may then be cut out with more safety from falling in. The stones should not be filled nearer to the surface than 18 inches, leaving 16 inches free for deep ploughing.

The upper surface of the stones having been made straight and uniform, the whole should be neatly and closely covered with a thin thatch or *flauchter divot* or turf, cut from the adjoining surface or brought from some suitable place. *Strict attention to the correct execution of this operation is of the greatest importance, as many drains are ruined at once from the running in of the loose earth.* Thick turfs are objectionable, from the difficulty of getting them to fit close. Straw, rushes, broom, whins, and other like materials, are very objectionable, affording no certain or uniform security, and forming a receptacle for vermin; peat moss, in a thin layer, well beat down, may be used to advantage. When the deepest ploughing has been executed, there should always remain a firm crust of earth undisturbed over the stones of the drain; and no surface water should ever have access to the free way of a drain by any *direct* opening, but should find its way by percolation or filtration through the subsoil, and should always enter by the sides of the drains. It may be of advantage to tread or beat down closely the first two inches of soil put over the turf, in order to form the permanent crust.

The cost of executing such drains varies, of course, according to circumstances—the cutting costing from 1s. 6d. to 2s. 6d. per rood of 36 yards, according to the hardness of the subsoil; the stones, if collected on the adjoining fields, will cost from 1s. to 1s. 6d. per rood, the breaking from 9d. to 1s. per rood; about 1½ cubic yards of broken stones will fill a rood of a narrow and well cut drain; the putting in of the stones may be

calculated to cost about 3d. per rood, and the turving about 1d. ; the filling in of the earth over the stones with the plough will cost about 1d. per rood. The whole cost per rood of common drains may be taken at 4s. 8d., or including a charge to cover proportions of main drains, 5s.

The following tables exhibit the cost per Scotch acre, and per statute acre, of draining in this method, at various distances between the drains ; and such forming a permanent improvement of land, it is presumed the proprietor should defray part of the expense.

The tables are therefore constructed to show how much it will cost the landlord in money to do the cutting, furnishing, breaking, and filling in of stones, and turving ; and how much the horse work, &c., to be performed by the tenant, will cost, charged at the ordinary rates.

TABLE BY THE SCOTCH ACRE.

Subsoils to which the distances are applicable.	Distance between the drains in feet.	Roods per Acre.	Cost per Rood to Landlord.		Cost per Acre to Landlord.		Cost per Rood to Farmer.		Cost per Acre to Farmer.		Total Cost per Acre.	
			s.	d.	£	s.	d.	s.	d.	£	s.	d.
For hard till subsoil,	10	48	3	4	£	8	0	1	8	4	0	0
" "	11	43½	"	"	7	5	10	"	"	3	12	11
" "	12	40	"	"	6	13	4	"	"	3	6	8
Stiff Clay, . .	13	37	"	"	6	3	4	"	"	3	1	8
" "	14	34½	"	"	5	14	5	"	"	2	17	3
Sandy Clay, . .	15	32	"	"	5	6	8	"	"	2	13	4
" "	16	30	"	"	5	0	0	"	"	2	10	0
" "	17	28½	"	"	4	14	2	"	"	2	7	1
" "	18	26½	"	"	4	9	2	"	"	2	4	7
" "	19	25½	"	"	4	4	5	"	"	2	2	3
" "	20	24	"	"	4	0	0	"	"	2	0	0
Free stony bottom,	21	23	"	"	3	16	8	"	"	1	18	4
" "	22	21½	"	"	3	12	6	"	"	1	16	3
" "	23	20½	"	"	3	9	2	"	"	1	14	7
" "	24	20	"	"	3	6	8	"	"	1	13	4
" "	25	19½	"	"	3	4	2	"	"	1	12	1
" "	26	18½	"	"	3	1	8	"	"	1	10	10
" "	27	17½	"	"	2	19	2	"	"	1	9	7
" "	28	17	"	"	2	16	8	"	"	1	8	4
" "	29	16½	"	"	2	15	0	"	"	1	7	6
More open bottom,	30	16	"	"	2	13	4	"	"	1	6	8
" "	31	15½	"	"	2	11	8	"	"	1	5	10
" "	32	15	"	"	2	10	0	"	"	1	5	0
" "	33	14½	"	"	2	8	4	"	"	1	4	2
" "	34	14	"	"	2	6	8	"	"	1	3	4
Irregular beds of gravel or sand, and irregular open rocky stratifications,	35	13½	"	"	2	5	10	"	"	1	2	11
" "	36	13½	"	"	2	4	5	"	"	1	2	3
" "	37	13	"	"	2	3	4	"	"	1	1	8
" "	38	12½	"	"	2	2	6	"	"	1	1	3
" "	39	12½	"	"	2	1	1	"	"	1	0	7
" "	40	12	"	"	2	0	0	"	"	1	0	0

TABLE BY THE STATUTE ACRE.

Subsoils to which the distances are applicable.	Distance between the drains in feet.	Roads per Acre.	Cost per Road to Landlord.	Cost per Acre to Landlord.	Cost per Road to Farmer.	Cost per Acre to Farmer.	Total Cost per Acre.
			s. d.	£ s. d.	s. d.	£ s. d.	£ s. d.
For hard till subsoil,	10	38	4	6 6 8	1 8	3 3 4	9 10 0
" "	11	34½		5 15 0		2 17 6	8 12 6
" "	12	31½		5 5 10		2 12 11	7 18 9
Stiff clay, . . .	13	29½		4 17 6		2 8 9	7 6 3
" "	14	27½		4 10 10		2 5 5	6 16 3
Sandy Clay, . .	15	25½		4 4 5		2 2 2	6 6 7
" "	16	24		4 0 0		2 0 0	6 0 0
" "	17	22½		3 15 0		1 17 6	5 12 6
" "	18	21½		3 10 10		1 15 5	5 6 3
" "	19	20		3 6 8		1 13 4	5 0 0
" "	20	19		3 3 4		1 11 8	4 15 0
Free stony bottom,	21	18		3 0 0		1 10 0	4 10 0
" "	22	17½		2 17 6		1 8 9	4 6 3
" "	23	16½		2 15 0		1 7 6	4 2 6
" "	24	16		2 13 4		1 6 8	4 0 0
" "	25	15½		2 10 10		1 5 5	3 16 3
" "	26	14½		2 8 4		1 4 6	3 12 2
" "	27	14		2 6 8		1 3 4	3 10 0
" "	28	13½		2 5 0		1 2 6	3 7 6
" "	29	13		2 3 4		1 1 5	3 4 0
More open bottom,	30	12½		2 1 8		1 0 10	3 2 6
" "	31	12½		2 0 10		1 0 5	3 1 3
" "	32	12		2 0 0		1 0 0	3 0 0
" "	33	11½		1 18 4		0 19 2	2 17 6
" "	34	11½		1 17 6		0 18 9	2 16 3
" "	35	11		1 16 8		0 18 4	2 15 0
Irregular beds of gravel or sand, and	36	10½		1 15 10		0 17 11	2 13 9
irregular open rocky stratifications, .	37	10½		1 14 2		0 17 1	2 11 3
" "	38	10		1 13 4		0 16 8	2 10 0
" "	39	9½		1 12 6		0 16 3	2 7 9
" "	40	9½		1 11 8		0 15 10	2 8 6

As the use of tiles in thorough draining has now become pretty general, I have given below a table, showing the costs per acre by that mode. I am still of opinion that small stones form the best filling for drains, both as to efficiency and permanency, and are the cheapest wherever stones are plentiful. The tile, however, is a very ready mode, especially in clay districts, and when the horses on a farm are nearly fully occupied in the ordinary routine of farm work. Besides, when tiles are given by the landlord, which I hope will soon become general, the expense of cutting the drains and carting the tiles, which falls upon the farmer, is much less than when stones are used. It is painful to see the practice, still very prevalent, of filling drains too near the surface, either with stones or tiles; for it is obvious that the deeper drains (not to exceed three feet) draw better than the shallower ones; and as all land ought to be subsoiled once, and occasionally trenched to the depth of

16 inches, drains filled nearer the surface than 18 inches are sure to obstruct the plough, and are likely to be injured in many places by the foot of the horse or the share of the plough.

TABLE SHOWING THE COST WHERE TILES ARE USED,
PER SCOTCH ACRE.

Distance between the drains in feet.	Roods per Acre.	Cost of tiles with soles, and reckoning 100 to the Rood of Drains.				Cost of Cutting and Laying.	
		Tiles, 14s.; Soles, 7s. 2s. 1d. per Rood.	Tiles, 18s.; Soles, 9s. 2s. 8d. per Rood.	Tiles, 22s.; Soles, 11s. 3s. 4d. per Rood.	Tiles, 28s.; Soles, 14s. 4s. 2d. per Rood.	In Carse 1s. per Rood.	In Dryfield, 2s. per Rood.
10	48	5 0 0	6 8 0	8 0 0	10 0 0	2 8 0	4 16 0
11	43 $\frac{1}{2}$	4 11 2	5 16 8	7 5 10	9 2 4	2 3 9	4 7 6
12	40	4 3 4	5 6 8	6 13 4	8 6 8	2 0 0	4 0 0
13	37	3 17 1	4 18 8	6 3 4	7 14 2	1 17 0	3 14 0
14	34 $\frac{1}{2}$	3 11 6	4 11 6	5 14 5	7 3 1	1 14 4	3 8 8
15	32	3 6 8	4 5 4	5 6 8	6 13 4	1 12 0	3 4 0
16	30	3 2 6	4 0 0	5 0 0	6 5 0	1 10 0	3 0 0
17	28 $\frac{1}{2}$	2 18 10	3 15 4	4 14 2	5 17 9	1 8 3	2 16 6
18	26 $\frac{1}{2}$	2 15 9	3 11 4	4 9 2	5 11 6	1 6 9	2 13 6
19	25 $\frac{1}{2}$	2 12 9	3 7 6	4 4 5	5 5 7	1 5 4	2 10 8
20	24	2 10 0	3 4 0	4 0 0	5 0 0	1 4 0	2 8 0
21	23	2 7 11	3 1 4	3 16 8	4 15 10	1 3 0	2 6 0
22	21 $\frac{1}{2}$	2 5 4	2 18 0	3 12 6	4 10 8	1 1 9	2 3 6
23	20 $\frac{1}{2}$	2 3 3	2 15 4	3 9 2	4 6 6	1 0 9	2 1 6
24	20	2 1 8	2 13 4	3 6 8	4 3 4	1 0 0	2 0 0
25	19 $\frac{1}{2}$	2 0 1	2 11 4	3 4 2	4 0 2	0 19 3	1 18 6
26	18 $\frac{1}{2}$	1 18 7	2 9 4	3 1 8	3 17 1	0 18 6	1 17 0
27	17 $\frac{1}{2}$	1 17 0	2 7 4	2 19 2	3 14 0	0 17 9	1 15 6
28	17	1 15 5	2 5 4	2 16 8	3 10 10	0 17 0	1 14 0
29	16 $\frac{1}{2}$	1 14 5	2 4 0	2 15 0	3 8 9	0 16 6	1 13 0
30	16	1 13 4	2 2 8	2 13 4	3 6 8	0 16 0	1 12 0
31	15 $\frac{1}{2}$	1 12 4	2 1 4	2 11 8	3 4 7	0 15 6	1 11 0
32	15	1 11 3	2 0 0	2 10 0	3 2 6	0 15 0	1 10 0
33	14 $\frac{1}{2}$	1 10 3	1 18 8	2 8 4	3 0 5	0 14 6	1 9 0
34	14	1 9 2	1 17 4	2 6 8	2 18 4	0 14 0	1 8 0
35	13 $\frac{1}{2}$	1 8 8	1 16 8	2 5 10	2 17 4	0 13 9	1 7 6
36	13 $\frac{1}{2}$	1 7 9	1 15 6	2 4 5	2 15 7	0 13 4	1 6 8
37	13	1 7 1	1 14 8	2 3 4	2 14 2	0 13 0	1 6 0
38	12 $\frac{1}{2}$	1 6 7	1 14 0	2 2 6	2 13 2	0 12 9	1 5 6
39	12 $\frac{1}{2}$	1 5 8	1 12 10	2 1 1	2 11 5	0 12 4	1 4 8
40	12	1 5 0	1 12 0	2 0 0	2 10 0	0 12 0	1 4 0

In cases where time or capital are wanting to complete the drainage at once, each alternate drain may be executed in the first instance, and the remainder can be done the next time the field is to be broken up.

After the drainage has been completed, a crop of oats may be taken from the field; and immediately after that crop shall have been separated from the ground, the field should be gone thoroughly over with the Subsoil Plough, crossing the lines of drains at right angles.

The SUBSOIL PLOUGH, as exhibited in Messrs Drummonds'

Agricultural Museum (of which a figure and description are annexed), has been constructed on principles appearing the best fitted to break up the subsoil completely, to a depth sufficient for most thorough cultivation, say 14 to 16 inches, whilst the active soil is still retained on the surface—to be of the easiest possible draught in reference to the depth of furrow and firmness of the subsoil—to have strength and massive weight sufficient to penetrate the hardest stratum—to resist the shocks from fast stones—and to throw out all stones under 200 lbs. in weight. All this has been accomplished and practically proved at Deanston, over an extent of at least 200 acres of various soils; and reports of the successful application of those ploughs, in various parts of England, Scotland, and Ireland, during several seasons, have been received. The plough requires four good horses, an active ploughman, and a lad to drive the horses and manage them at the turnings. Six horses, yoked three and three abreast, may be necessary in some very stiff or stony soils. A common plough, drawn by two horses, goes before the subsoil plough, throwing out a large open furrow of the active soil; the subsoil plough following, slits up thoroughly and breaks the subsoil, and the next furrow of active soil is thrown over the last opened furrow of the subsoil; the stones brought to the surface by the subsoil plough being thrown aside on the ploughed part of the land by a lad, thus the work proceeds until the whole field is gone over. The lad should carry a bag of wooden pins, that he may mark the site of the large fast stones which the plough cannot throw out, and which must afterwards be dug out with the pick, and perhaps blasted.

This large plough is a sort of *horse-pick*, breaking up without raising to the surface any of the subsoil. Channels are thus regularly formed for the water to flow from all parts toward the drains. The atmospheric air being also by this means freely admitted to the body of the subsoil, the most sterile and obdurate till, becomes gradually ameliorated, and the common plough may ever after be wrought to a depth of from 10 to 12 inches without obstruction, and with the power of three horses, yoked abreast, and managed with ease by the ploughman without any person to drive; being thus yoked together, and near the point of resistance, the horses have

great power. The furrow turned over being broad in proportion, nearly one-half more ground will be gone over in a day than with a plough drawn by two horses.

The charge of subsoil ploughing may be estimated at 24s., to 30s. per statute acre, being one-fifth of what a similar depth with the spade would cost, and upon the whole as effectually done. When land, which has been opened up by the subsoil plough, shall have undergone the first rotation of cropping, several inches of the subsoil may be taken up by the plough to mix with the active soil, and in proportion as the subsoil is ameliorated, so may the greater depth be taken up with advantage. In the richer subsoils it is sometimes expedient to plough to the whole depth of the moved subsoil on the first application of the trench plough. The trench plough recommended for this process, should be made in the form of Wilkie's plough, having all its dimensions made of double size, or what is found to answer fully as well, by a plough in the fashion of the old Scotch plough, but also of double the dimensions. Such ploughs require six horses, yoked three and three abreast, with one man to hold the plough, and another to manage the horses, to do the work effectually. This operation should be performed in turning over the winter furrow preparatory to the green crop, and the sooner the work is performed after harvest the better. In estimating the expense of this operation, the horses may be charged at 4s. each, to cover all expenses, tear and wear, &c., which will amount to 24s.; two men, 2s. = 4s.; and an attendant lad to pick up the stones, 1s.; in all 29s. As the work is heavy, the motion of the horses is necessarily slow, and it will in general take eight hours' working to accomplish one statute acre. The expense of this operation may appear alarming, but when it is considered that one such ploughing will be more effectual in killing weeds, and in exposing the soil to the air, than two ordinary ploughings, we may deduct the cost of two such = 20s., leaving 9s. to be charged against the deep working. All who have ever studied or experienced the most common gardening, must be aware of the important advantages of deep working, and when it can be attained in the broad field of farming at so small an additional cost as 9s. per acre, they may easily believe that the whole will be more than doubly repaid in every succeeding grain crop, and abun-

dantly even in pasture. When land has been thoroughly drained, deeply wrought, and well manured, the most unpromising sterile soil becomes a deep rich loam; rivalling in fertility the best natural land in the country, and from being fitted for raising only scanty crops of common oats, will bear good crops of from 32 to 48 bushels of wheat, 30 to 40 bushels of beans, 40 to 60 bushels of barley, and from 48 to 70 bushels of early oats, per statute acre, besides potatoes, turnips, mangel wurtzel, and carrot, as green crops, and which all good agriculturists know are the abundant producers of the best manure. It is hardly possible to estimate all the advantages of dry and deep land. Every operation in husbandry is thereby facilitated and cheapened—less seed and less manure produce a full effect, the chances of a good and early tid* for sowing are greatly increased—a matter of great importance in our precarious climate,—and there can be no doubt that even the climate itself will be much improved by the general prevalence of dry land. When this subject was treated of in the Second Report of Drummonds' Agricultural Museum, published in March 1833, the system was beginning to be adopted in a few places in a very few districts of Scotland, England, and Ireland, and in most instances on a very limited scale. Since then the intrinsic merits and evident outspeaking results of the system have raised its character, even with many of its former opponents; and one cannot now travel almost any where in the country without seeing, either on a large or a small scale, the operation of thorough draining going on. The deep ploughing is not yet so general, but it will undoubtedly follow; *and it is to be regretted that, in the meantime, some zealous and good farmers, not aware of its advantages, are filling their drains so near the surface as to mar the future thorough application of the system of deep working.*†

* "Tid," a Scotch term, for that state of the ploughed soil, which is most suitable for receiving the seed—neither too moist nor too dry.

† I have been often asked if I would recommend subsoil ploughing of land which had not been drained. To this, I answer, certainly not; for, until there is an escape for the water through the subsoil, any opening of it but provides a greater space for holding water, and will rather tend to injure than improve the soil. Where the subsoil consists of gravel, or sand, or *moor-band*, forming a crust over a lower stratum of open subsoil, then the subsoil plough being applied, will at once provide a passage for the water, and leave the *incumbent* subsoil open for amelioration. It has been remarked by an intelligent forester that in planting wet

Thorough draining is the foundation of all good husbandry, and, when combined with deep ploughing, insures a general and uniform fertility, assisted no doubt by the *essentials*, thorough working and cleaning, ample manuring, and a proper rotation of cropping.

In making a survey of the agricultural aspect of Scotland, and great part of England, it must be evident to every one skilled in agriculture, that by much the greatest proportion of the arable land, indeed we may assume three-fourths of the whole, is under very indifferent culture, arising mainly from the want of complete draining and deep working; and, looking, even to the best farmed districts, with the eye of a farmer experienced in the thorough system, much of the land will be seen suffering under wet or damp. All the heavy lands of the Lothians, Berwickshire, Fife, Strathmore, Clydesdale, &c., would be greatly benefited by the introduction of the system, and if generally adopted we would hear no more of "stiff clays," "cold retentive soils," and the like, in the Agricultural Reports.

There is no want of employment for all the spare labour and spare capital of the country, in the general thorough cultivation of the soil, and if properly gone about, it will afford ample remuneration to the individual possessors and farmers of the land, while the wealth of the country will be greatly increased.

The cultivation of the inferior soils will tend to lower the value of the high rented lands, but the general rental of the country will be much increased, whilst the prices of all agricultural produce will be lowered, thereby affording cheaper sustenance to the manufacturers, which will enable them to meet more effectually the cheap labour of other countries; and it is not at all improbable that Britain may become an exporting country in grain in the course of the next twenty years, thereby

bottomed land, *pitting* to receive the plants is most objectionable, because in wet weather the loose earth of the pit gets filled with water, which is either acted upon by frost to the injury of the plant, or the constant immersion of the roots in water causes their decay; on the contrary, *sitting* gives the plant a hold of the ground, the roots are pushed into the solid in search of nourishment, whilst the vacuities capable of receiving water are very small. In like manner the opening of the subsoil in a tenacious bottom forms one great pit over the whole field, holding water most destructive to the growth of cultivated plants. On this principle the experience of ages has taught the English agriculturist on tenacious clays to follow a system of shallow ploughing. So soon as wet lands are thoroughly drained, deep ploughing may follow with the greatest advantage, but not sooner.

overthrowing the bugbear corn laws without a political struggle. This may appear a very bold anticipation, but to those who know intimately the history of the progress of the wonderful improvements which have taken place in the various leading manufactures of the country, in the course of the last twenty years (and who can appreciate the vast improvement of which agriculture is yet susceptible), it will seem as no very hopeless prospect. Often has it been thought during the progress of the manufactures that the perfection of these arts had been attained, when, by the application of science, capital, division of labour, or industry, or all these together, some new and extensive step was gained, whereby the cost of production was cheapened, then followed a lower selling price to the consumer, and immediately the field of consumption was extended. In most cases those steps of improvement were urged, *more by the necessity arising from low profits and extensive rivalry*, than from the encouragement of high profits and extensive demand. So it is now operating with the agriculturist. During the reign of high prices any sort of farming was sure to pay; but now, when prices are low, nothing but skill, and capital, and well regulated industry will do; and, since higher prices are scarcely to be looked for, the only hope of the landowner and the farmer is to use every means to produce their articles cheaper and in greater quantity from the same extent of land. From the progress which the system of thorough drainage has already made, the *lists* are fairly entered by the hitherto considered poorer soils against the rich, the rivalry cannot be stopped, and the result will shortly be, a greater agricultural advancement in Great Britain than has ever before taken place. The grand natural prompter, *Self-interest*, will in due time work out the result. Yet much may be done in assistance by the exertions of proprietors and agricultural associations, and by the national legislature, in the case of entailed lands.

SUBSOIL PLOUGH

Fig 1

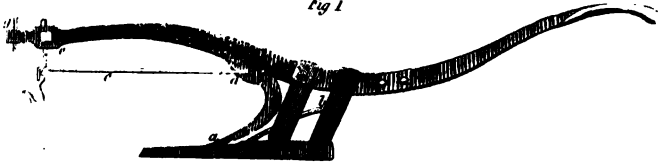


Fig. 2

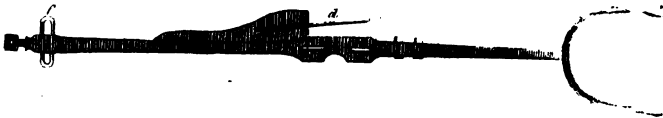


Fig. 3

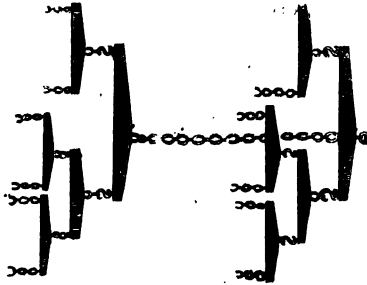
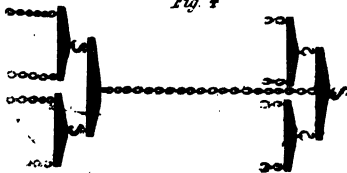


Fig. 4



SUBSOIL PLOUGH AND DEEP FURROW PLOUGH.

BY JAMES SMITH, ESQ. OF DEANSTON WORKS.

THE SUBSOIL PLOUGH, of which an elevation and bird's eye view are given on the adjoining plate, was designed by the writer of this article, about twelve years ago, for the purpose of opening up the close subsoil of the farm of Deanston.

In the design, two essential points were kept in view.—1. The construction of an instrument that would effectually open up the subsoil without throwing any of it to the surface, or mixing it with the active or surface soil.—2. To have an implement of the easiest possible draught for the horses, while it was of sufficient strength and weight to penetrate the firmest ground, and resist the shocks on the largest stones.

The extreme length of the plough is about 15 feet. From the socket at the point of the beam to the first stile or upright, 6 feet; from thence to the back of second stile, 19 inches; from thence to the outer end of holding handles, 7 feet; from the sole to the bottom of beam at stiles, 19 inches; length of head or sole bar, 30 inches; from heel of sole to point of sock, 46 inches; broadest part of sock, 8 inches. The coulter is curved, and in order to prevent its point from being driven from its place by stones, it is inserted to the depth of an inch in the socket (*a*). The lateral demensions of the sole piece are two inches square. This is covered on the bottom and land side with a cast-iron sole piece, to prevent wear. The sock goes on to the head in the usual way, and from its feather rises the spur piece (*b*), for the purpose of breaking the subsoil furrow. When the subsoil consists of very firm clay or other hard and compact earth, the feather and spur piece may be dispensed with, and a plain wedge or spear-pointed sock, such as those of the old Scotch plough, may be used. The draught bar (*c*), of $1\frac{1}{2}$ inch round iron, is attached to the beam at the strong eye (*d*), and passing through an eye in the upright needle (*e*) is adjustable to any height or lateral direction, being moveable in the socket (*f*) at the point of the beam, and can be made fast at any point by a pinching screw wrought by the lever (*g*). By the proper setting of

the draught rod, the direction of the power of the horses is so regulated as to render the guiding of the plough easy at any depth or width of furrow. The beam is about 5 inches deep in the middle, and $1\frac{1}{4}$ inch in thickness—towards the draught end it tapers to 3 inches deep, and 1 inch thick; at the holding end where the handles branch off, it is 2 inches by 1. The whole weighs 400lbs. imperial. This appears an enormous weight, and most people are alarmed at the strength and weight of the implement, but after repeated trials with lighter ploughs, those of the demensions and weight now described have been found to be at once the most efficient, the most easy of draught, and the easiest for the ploughman to manage.

Four ordinary farm horses are generally sufficient to draw this plough in breaking up subsoil of ordinary firmness; but on very tough clays, or in hard till, it may be found necessary to use six horses. When four are used, they are yoked two and two, by draught bars and chains, as shown in fig. 4. When six are used, they are yoked three and three, by draught bars and chains, as shown in fig. 3. The main chain for the leading horses to pull by is hung, in both cases, by links from the collars of the rear horses, to keep it from their legs, and the trace bars of the leaders are kept close up to their hams by cross straps over their quarters.

When horses, which have been accustomed to work in pairs, are first put to work in this plough, they are apt to be a little restive, and do not at first pull well together, and this is especially the case when the subsoil is stony. The ploughman also finds some difficulty in balancing the plough at first, and if he is not a man of quiet and firm temper, the whole affair puts on the appearance of an arduous and hopeless undertaking; a few hours or days at most, however, of temperate perseverance, will overcome all difficulties, and horses and men will work together with steadiness and effect. The work is, indeed, in most cases severe, and the horses are frequently warm and fatigued; but to ensure good farming, the work *must* be done, and will amply repay all the trouble and expense. When a field or farm has been once efficiently gone over with the subsoil plough, it is not again necessary to repeat the operation, as the original stratum of the subsoil has been completely broken up, and all land stones which offer any serious obstruc-

tion to the plough have been removed. In after operations of deep ploughing, the work should be performed by an implement in all respects resembling the common plough, either Small's, Wilkie's, or the old Scotch plough, but of double the dimensions in all parts. In free soils, four horses, yoked two and two, are sufficient to plough to a depth of 16 inches ; but in heavier soils, six horses, yoked three and three, will be found necessary. This plough, which may be called a Trench Plough, should be applied once in each rotation of cropping, and the best time is in giving the first furrow for green crop, or in the event of the summer fallow being followed, in the first furrow of that operation ; this plough makes a mixture of the soil and subsoil, for which the latter has been prepared by the admission of air and water from the effects of the subsoil plough.

The operation, both with the subsoil and trench plough, should run at right angles to the line of the drains, as channels are thereby opened for the rain water to flow towards the drains. When drains have been some time executed, innumerable small fissures will be found in the subsoil, extending from drain to drain ; these are caused by the contraction of the substance of the soil arising from its drier state—the contraction being greatest in the stiffest clays—the operation of the subsoil plough admitting the air to a greater depth, the fissures take place under its operations, and generally reach to the level of the bottom of the drains. These fissures will get more or less silted or glutted up from time to time by the minute alluvial particles carried down and left in filtration by the rain water, but the constant expansion and contraction of the unremoved subsoil, by the alternations of wet and dry, has a perpetual tendency to renew them ; so that so long as the drains flow freely there will never be wanting minute channels for the percolation of the water from all parts towards the drains.

** * Since the first publication of the above, in 1835, W. Drummond & Sons, Stirling, have furnished, and continue to furnish, to order, a great many Subsoil Ploughs, partly of lighter weights for the lighter soils, and subject to the inspection of Mr Smith, the inventor. W. D. & Sons also supply Draught Bars or Swing Trees, and Soam Chains, adapted to the various modes of yoking the Subsoil Plough.*

M'EWAN'S DRAINING PLOUGH.

BY JAMES SMITH, ESQ. OF DEANSTON WORKS.

THOROUGH DRAINING having now become in this country a most important process in the labour of the agriculturist, any means of expediting its execution, and diminishing its cost, must be considered one of the greatest boons that can be bestowed upon the farmer.

Since the first introduction of the system of frequent draining, a yearly progress has been made in improved execution and lowered cost, and in most districts where it has been practised a class of excellent workmen has been created; so that comparatively with the earlier years, the work does not now cost one-half of what it did. Still the expense is considerable, and any material reduction in cost will tend much to extend the application of this powerful arm of cultivation.

Various attempts have been made by enterprising and ingenious individuals, to apply the principle of the plough in cutting drains, and, in some cases, considerable success has attended those attempts. In most cases, however, the design has been on too limited a view, and the construction of the implement too slight and contracted to admit of complete success. There is one error most fatal to successful invention, into which, unfortunately, most inexperienced inventors fall. It is an attempt to make an implement adjustable to too many purposes. When an implement is made to apply to one purpose only, there is full scope left for its complete adaptation to that purpose; and it must be a very expensive implement and of very limited use, if it will not pay to be made for one purpose alone.

The surface and subsoils of this country are so various in their nature, that it is no easy task to design a drain plough applicable to many of them, and almost impossible to get such to apply to all. There is the *carse* or soft clay; the indurated clay of the higher districts, and the stony earth and *moor-band*,

MC EWAN'S DRAIN PLOUGH

Fig 1

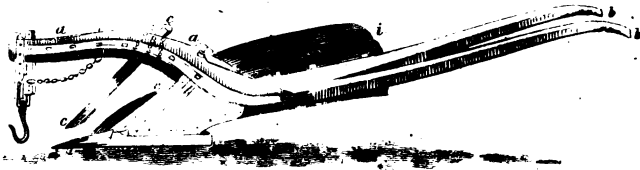


Fig. 2

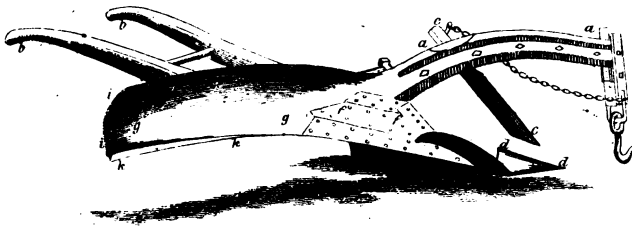
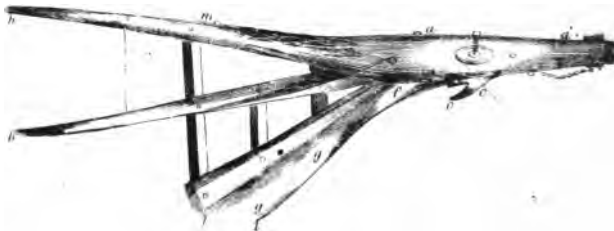


Fig. 3



1

2

forming by far the greatest extent of arable land in Scotland, perhaps in Britain. In the softer clays the application of the plough is most easy, as they repose in a uniform and free mass, with no stones; in the upland clays there is in general a firm and stubborn mass, and in many instances a pretty frequent mixture of stone, of various sizes, from the large whin boulder to stones the size of a hen's egg. The earthy subsoils of the uplands are generally full of small stones, with an occasional boulder, and in both cases picking is necessary in cutting drains. In these, therefore, the inventor of the draining plough finds his greatest difficulties. The softer clay is certainly the best field for first experiments, and having there found the proper form of implement and mode of application, an attempt may be made upon the more obdurate materials.

Mr Peter M'Ewan, tenant in Blackdub of Blairdrummond, near Stirling, turned his attention to this subject some years ago, and by the most unconquerable perseverance, and with much ingenuity, he has wrought out an implement, which, in his own carse lands, effects the opening of drains to a depth of from 18 to 22 inches, in the most perfect manner, and at the small cost of about 2d. per rood of 36 yards.

The application of this instrument in the higher grounds, in the more firm and strong subsoils, has not yet been fully proved; and some experience and modification of form may be necessary to establish its successful application in such lands; but from the general form of the plough, and the complete success of its application in the carse, there can be no doubt that with a sufficiently massive and strong implement, drawn by a powerful team of horses, the work may be accomplished in most situations.

The leading principles of the construction of Mr M'Ewan's draining plough are—Having it of such large dimensions as to turn out at once the full depth of the drain, which is the more easily accomplished by having the furrow of a wedge shape, and ample in its width, so that when separated from the soil it shall lift freely out. Having the mould board or inclined plane of the plough of great length, and consequently of easy slope, so that the great and weighty furrow shall be gradually raised, whilst by the same form, the plough is rendered more steady and easy to hold. The furrow is taken clear

out, and laid along the drain at about one foot distant from the margin. From eight to twelve horses are necessary to work this plough in carse land according to the nature of the soil, and it is probable that sixteen may be necessary in some obdurate clays. The pace of the horses must be slow—say two miles an hour, and the plough is easily directed by one man. After the plough has done its work, men follow with small spades, to take out a space for tiles or for broken stones, and to correct any deviation from the uniform fall of the bottom, caused by any unevenness of the ground. The tiles or stones are then put in, and the furrow turned in over them by the same plough, somewhat altered, as will afterwards be described.

The cost of the plough work in opening the drain, taking twelve horses as a medium number, will run thus:—

12 horses at 4s. per day, ...	£2	8	0
8 men at 2s. per day, ...	0	16	0
To cover interest of cost, and tear and wear of plough, say 1s. per hour,.....	0	8	0
	£3	12	0

If the horses were to move continually at a rate of two miles per hour, they would turn out 782 roods of 36 yards in 8 hours; but in so heavy an operation, much time is lost in turnings and otherwise, so that one-third may be deducted to cover loss of time, which will leave 521 roods of work done, which at the above cost, will come to 1½d. per rood; but say 2d. per rood of 36 yards, which will cover the expense of ploughing in also.

In order to illustrate the form and dimensions of the plough, exhibiting three different views, a plate is given, and the following is a description of it. The same figures and letters refer to the same parts in all the views. Fig. 1st exhibits a longitudinal view looking towards the land side of the plough. Fig. 2d, a longitudinal view of the opposite side. Fig. 3d, a bird's eye view. *a a* The beam of strong timber, 6½ feet long, embraced with iron, and about nine inches deep at the root, and 6½ inches broad, 4 inches square at the point; *b b* the stilts and handles, 7½ feet long from the insertion at the beam to the holding point; *c c* the coulter; *d d* the sock; *e e a*

spur coulter, which rises from the outside of the feather of the sock, and stands about 20 inches high from the bottom, with an inclination backward; *ff* the fore part of the mould board of wood, and covered with strong sheet iron; *gg* the tail mould board of wood, covered with sheet iron. This part of the mould board rises gradually in a twisted plane towards the surface of the ground, and the upper end at *ii* passes over the edge of the drain so as to throw the furrow about 12 inches from the side of the drain; *kk* a crib piece projecting about 3 inches from the plane of the mould board at its lower edge, whereby the furrow is prevented from slipping down the face of the mould board, whilst by its weight it keeps down that side of the plough, resisting the tendency which the plough has to be thrown over towards the opposite side, by the pressing off of the furrow. The mould board is supported by wooden stays *ll*; is 7 feet in length, and the distance from the upper end across to the left stilt at *m* 4 feet. At the outer end of the beam is a strong muzzle piece with holes for adjusting the line of draught in the usual manner. The horses go on each side of the line of drain, the near horse of the off side division going in the furrow, all being yoked to a strong main-bar, or master tree, 10 feet long, and arranged in fours or sixes abreast, as may be necessary—four abreast when eight horses are used, and six when twelve are used. The leading horses draw from a second main bar attached to the muzzle, by a chain passing along betwixt the middle horses behind. When the plough reaches the end of a line of drain, and is about to be turned, the draught chain of the leading horse is detached, and a man taking hold of the chain, the bar resting on the ground, follows round till in a position to be yoked for the next line of drain, the plough following, drawn by the rear horses. When working, each pair of horses is led by a man—one man to each range of horses, going in the middle, and leading a horse in each hand, and a man going on each flank leading the two horses next him: the steadiest men being put in the middle, to keep a direct line for the drain. The man who lifts the chain assists the ploughman in raising the plough from the drain just completed, and in going round and entering for the next drain. When the plough is to be applied in turning *in* the furrow, the double-feathered sock with the

spur coulter is removed, and a plain common single-feathered sock put in its place. To the back of the mould board, a piece of board is attached, for filling up the vacant space from the lower edge of the mould board to the ground. At this work, the plough is drawn either by three or five horses, as the land may require, pulling from a main bar or master-tree, 13 feet long. When three horses are used, two are yoked to the end of the bar crossing the furrow, which has been laid out, and one to the opposite end of the bar, on the other side of the drain, the bar being attached to the muzzle of the plough at one-third of its length, from the point at which the two horses draw. When five horses are used three go on the furrow side of the drain, and two on the other. One man is required to hold the plough, and a man on each side of the drain to guide the horses. The pace of going may be equal to that in common ploughing.

The drain plough, like all things else of the same magnitude, and when in the hands of inexperienced persons, requires great patience and perseverance, especially when applied in and of a hard and stony nature, and can never succeed in the hands of impatient and careless people. But to those who take time and pains to have their men and horses fully broken in to the work, there will be an ample reward in the cheapness and expedition with which the drains shall be executed.

These ploughs are made of two sizes, one weighing about five cwt., costing about £11; and the other, weighing about four cwt., costing about £8, 8s.

The draught bars, or swing trees, necessary to accompany each plough, are two six horse-trees, four three horse-trees, and a strong chain; costing altogether about £4, 4s.

The ploughs, draught bars, and chains, are furnished to order by Messrs W. DRUMMOND and SONS, Stirling.

Of Mr M'Ewan's Drain Plough, there have been several made, two of which have been applied by intelligent practical farmers, in the harder subsoils of the higher country.—The following extracts will show that it promises to answer well in such land :—

(Copy.)—*From Mr Drew, farmer, Carmyle, near Glasgow, to Mr M'Ewan, Blackdub, near Stirling.*

“ Carmyle, 1st January, 1838.

“ DEAR SIR,—In regard to the drain plough, she is admirably constructed, and every part is well proportioned for 12 horses, so that there can be little alteration made. The soil that we had to work upon last year was a close stony retentive clay. After going down 8 inches, it had all to be mattocked, and it was wonderful how the drain plough turned out such stuff about 17 inches deep. We did not yoke more than 10 horses; the field being steep, we brought the drains all down the hill.—Yours, &c.

(Signed)

“ LAURENCE DREW.”

(Copy.)—*Mr John Glen, Farm Overseer, Hilton near Alloa, to Messrs Drummond and Sons, Stirling.*

“ Hilton, 25th January, 1838.

“ DEAR SIRS,—We have used Mr M'Ewan's drain plough for the last four months, and have drained 837 chains, Scotch measure, with it. Our land is hilly, and mostly composed of clay and small stones, and some parts of it sand and gravel. I find six horses enough for our land, and we lift from 15 to 17 inches. We do it all down hill, and up empty. In this way we drain 400 Scotch chains in nine hours, the width at top of drain $18\frac{1}{2}$, in bottom 8 inches, and all is sufficiently done. We find it to be a great saving.—Yours, &c.

(Signed)

“ JOHN GLEN.”

EXPLANATION OF THE ANNEXED PLATE.

The Implements are furnished by W. DRUMMOND & SONS, Stirling.

Fig. 1.—Section of the Frequent Drain with its Set.

- a* First Spade, common shape. (Black's ditching, No. 4, is generally preferred by Drainers in this district.)
- b* Second Spade, which follows the first, and is narrower.
- c* Pick, used when the subsoil is stony.
- d* Large Scoop-Shovel, for removing the loose earth after picking.

Fig. 2.—Section of the Wedge-Drain with its Set, as used in the Carse or Clay Soil.

- a* First or opening Spade, same as above.
- b* Second do. (Some use this and the following with a spur attached, but the best drainers prefer pushing with the toe on the shoulder of the spade.)
- c* Third or narrowest Spade.
- d* Narrow Scoop for cleaning out the bottom.

Fig. 3.—Section of the Tile-Drain with its Set.

- a* First Spade.
- b* Second do.
- c* A flat Scoop, with turned-up edge, for cleaning out the bottom.

Fig. 4.—A Flauchter Spade, used for cutting turf to cover the small stones in the Frequent Drain.

TRANSVERSE SECTION OF DRAINS &c
with Sketches of Implements used in their formation

Fig 1

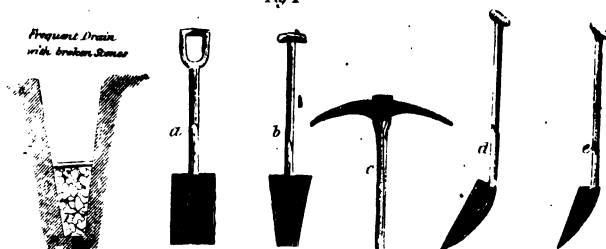


Fig. 2

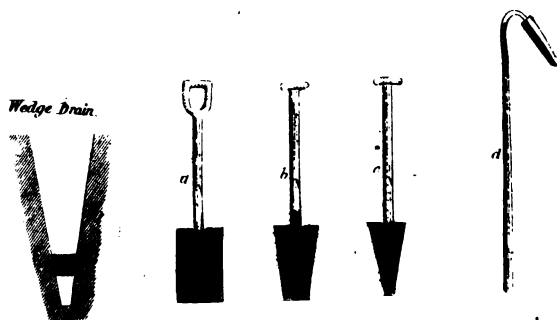


Fig. 4

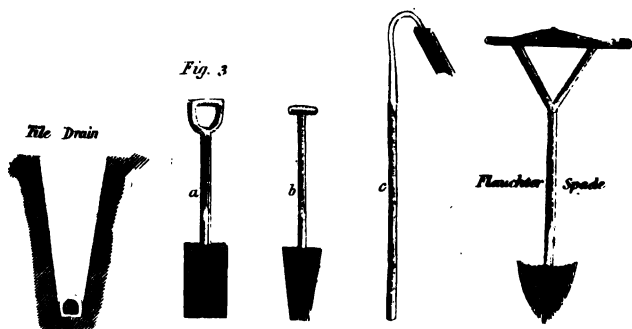


Fig. 3

A

GENERAL PRICED CATALOGUE

OF

IMPLEMENTS, SEEDS, PLANTS, &c.

SOLD AT THE

AGRICULTURAL MUSEUM

AND WAREHOUSE OF

W. DRUMMOND AND SONS,

SEEDSMEN AND NURSERYMEN,

STIRLING.

1843.

A GENERAL PRICED CATALOGUE, &c.

THIS Catalogue, not being annual or restricted to one season only, the sums which are affixed to each article, in order to give a general idea of the prices, are to be considered as the average rates, in such as are subject to variation from the seasons or other circumstances. Annual Lists and particular prices will be furnished as required.

AGRICULTURE.

FARM SEEDS.

1. CEREAL GRAINS.			s.	d.
Wheat, <i>per bushel</i> ,*	6s. to 8	0		
Essex				
Mungoswells				
Hunter's White				
Pearl				
Whittington				
Dwarf Cluster				
Blood Red				
Hopetoun and other ap- proved sorts				
Barley, ...	5s. to 6	0		
English, or common two- rowed				
Chevalier				
Golden or Italian				
Annat, &c.				
Oats, ...	4s. to 5	0		
Potato or Flemish				
Hopetoun				
Early Angus				
Cupar Grange				
Dun				
White Tartarian				
Sandy Early				
Dyocks Early				
Early Cumberland, &c.				
Rye, ...	5s. to 6	0		
2. FOR GREEN CROPS.				
Beans, ...	5s. to 7	0		
Scotch				
Tick				
Heligoland				
Pease, ...	5s. to 7	0		
Grey Field				
Partridge				
Early White				
Turnip, <i>per lb.</i>	9d. to 1	6		
Purple top Swede				
Skirvings do. do.				
Green-top do.				
Green-top Yellow, or Aberdeen Bullock				
Red-top Yellow				
Oxheart Yellow				
Turnip, <i>per lb.</i>	9d. to 1	6		
Dale's Hybrid do.				
Gordon's do.				
Tankard do.				
White Globe				
White Norfolk				
Green-top White				
Red-top do.				
Tankard do., &c.				
Carrot, ...	1s. 6d. to 2	6		
Altringham				
Long White				
Long Red				
Field Beet, ...	1s. 6d to 2	0		
Common or Mangel				
Wurtzel				
Golden				
Parsnip, ...	1s. 6d. to 2	0		
Jersey				
Large Hollow Crown				
Siberian Cow, recently introduced				
Potatoes, <i>per bushel</i> , ...	2s. to 3	0		
Bread				
Calico				
Buff				
Perthshire Red				
Guernsey Kidney				
Yam, for cattle				
Mangel Wurtzel for do.				
Cabbage, ...				
Drumhead, <i>per lb.</i>	2	6		
Cow or Tree, ...	5	0		
Jersey Kale, ...	5	0		
Kohl Rabi of sorts, ...	5	0		
Rape, Summer and Winter	4d. to 6d.			
3. FOR HERBAGE AND FORAGE.			s.	d.
Ryegrass, ...				
Annual, <i>per bushel</i> , ...	2s. to 3	0		
Perennial, ...	3s. to 5	0		
Pacey's do., ...	8s. to 10	0		

* *Per bushel*, although not expressed, is understood of all the immediately succeeding articles, until *per lb.* occurs, which is again understood in its succession, &c.

	s.	d.
Ryegrass,		
Stickney's do.,	8s. to 10	0
Italian,	10s. to 12	0
Timothy Grass, <i>per lb.</i>	7d. to 9d.	
Cocksfoot,	0	8
Meadow Foxtail,	1s. 6d. to 2	0
Meadow Fescue,	1s. to 1	3
Hard do.,	1s. to 1	3
Meadow Grass of sorts,	1s. to 1	6
Clover,		
Red	6d. to 9d.	
Red Perennial,	1s. to 1	3
White,	6d. to 0	9
Yellow, <i>per lb.</i> ,	4d. to 0	6
Alsike, (<i>Trifolium hybridum</i>), a valuable new species from Sweden.		
Crimson or Italian,	0	6
The above enumerated Grasses and Clovers may be considered as the most valuable for general purposes of hay or pasture; all other sorts occasionally required may also be had separate.		
Crested Dogstail Grass,	1	4

	s.	d.
Sweet Vernal Grass,	3	6
Poa nemoralis, for growing under trees,	3	0
Fiorin, for meadows,	2	0
Parsley, for sheep pasture,	1	0
Yarrow, for do.,	3	0
Rib Grass,	0	6
Lucerne,	1	3
Sainfoin,	0	4
Chicory for Cattle,	2	6
Large rooted for Coffee,	3	0
Melilot of sorts,	3s. to 5	0
New Bokhara Clover,		
ver,	5s. to 7	6
Tares, <i>per bushel</i> ,	7s. to 10	0
English		
Large Scotch		
Winter		
Linseed,	15	0
Hemp,	10	0
Buckwheat,	7	6
Grass Seeds, assorted and mixed, viz.		
For alternate Husbandry, <i>per imperial acre</i> ,	12s. to 16	0
For permanent pasture, 30s. to	40	0
For Lawns,	40s. to 50	

MISCELLANEOUS ARTICLES.

	s.	d.		s.	d.
Linseed, feeding, per bushel,	10	0	Rape Cake,	7	0
Linseed oil-cake, per cwt.,			Nitrate of Soda,	24s. to 30	0
9s. to 12	0		Bone Manure, per bushel,	3	0
Sago for horses, &c., 24s. to 30	0		Rock Salt,	1	6

IMPLEMENTS AND MACHINES.

1. FOR OPERATIONS ON THE SOIL.

	£	s.	d.
Ploughs, Iron Swing, from the most approved makers,	80s. to 5	0	0
Extra mounting for ditto, <i>per set</i> ,	0	18	0
Draught Bars for ditto, wooden,	0	10	0
Do. for do., Iron, with improved coupling, and being hollow cylinders, are light as well as durable,	20s. to 1	4	0
Bachop's new iron Plough Yoke for 3 horses,	1	5	0
Plough, Wilkie's new Turnwrest, for sides of hills, &c.,	130s. to 8	8	0
Do. Hinge Turnwrest, as invented and used by Mr Smith of Deanston,	160s. to 9	0	0
Ploughs, Subsoil of sizes from 200 to 400 lbs.,	100s. to 8	10	0
This Implement, invented by Mr Smith of Deanston, for the purpose of breaking up the subsoil without bringing it to the surface, is now extensively used, and attended with the most beneficial effects. An assortment of the different sizes, prepared under the auspices of the inventor, is at all times on sale at the Museum.			

	£	s.	d.
Soam chains for ditto, ...	7s. 6d.	to 0	10 0
Draught bars, for ditto, wooden, for 3 and 4 horses, ...		1	2 0
Do. do., iron for do., ...	40s.	to 2	5 0
Do. do. for do., wooden, for 6 horses, ...		2	5 0
Do. do., iron, for do., ...	80s.	to 4	10 0
Do. do. Deanston new equalizing, with pulleys and chains, 60s. to 3 10 0			
Leather Back Bands for do., ...	30s.	to 1	15 0
Plough, Deep Furrow or Trench, wooden, on the model of the one used by Mr Smith for turning up and mixing the soil to the full depth, which had, in the preceding rotation, been penetrated by the subsoil plough, ...	80s.	to 5	10 0
Do. do., of iron, ...	140s.	to 8	10 0
Do. subsoil and furrow, by which the operations of removing the furrow and subsoiling are performed, at alternate bouts, by the same ploughman and team of horses, ...		8	10 0
Do. McEwan's Draining, 2 sizes, turns out, at once, a depth of about 18 inches, the remainder being taken out with the spade, ...	168s.	to 12	0 0
Do. Alexander's Draining, turns out, at twice, a depth of about two feet, and completes the drain for the tile, without requiring the spade, ...		13	10 0
Draught bars and chain for do., ...		4	4 0
Glenbervie Turf Paring Plough, ...	100s.	to 6	10 0
Harrows, Rhomboidal and others, of the most approved construction, ...	40s.	to 2	10 0
Chain Web Harrow, large size, for breaking down fallow, 140s. to 8 0 0			
Do. do., medium size, for harrowing in grain, ...	100s.	to 6	0 0
Do. do., small size, for harrowing in grass, seeds, top-dressing, &c., 4 0 0			
The Chain Web Harrow was invented by Mr Smith of Deanston, in 1839, and first exhibited at Liverpool, in 1841, where it obtained a prize. It is constructed on principles to admit of self-adjustment to the surface of the land, to have many points of contact, and to cut down or mince the furrows, without tearing or turning the clod. The small sized is peculiarly fitted for giving the slight equal covering which grass seeds require, being superior in that respect to the bush harrow.			
Rollers, cast iron, of sorts, ...	240s.	to 17	0 0
Do., wooden, complete, ...	100s.	to 10	0 0
Finlayson's improved Harrow or Grubber, ...	130s.	to 9	0 0
Binnie's light two-horse Grubber, ...	50s.	to 2	15 0
Kirkwood's Grubber, of sizes, ...	180s.	to 12	0 0
One-horse Drill Grubber, with Double Mould-Boards and Parers, ...	100s.	to 5	10 0
Diamond Drill Harrows, very effective, ...		2	10 0
Drill or Horse Hoes of sorts, ...	36s.	to 2	2 0
Saddle-shape, do. do., ...	40s.	to 2	10 0
Expanding Horse Hoe and Harrow, much approved, 100s. to 5 5 0			
Double Mould-board Plough, for setting up green crops, 5 0 0			
Do. do., with coulter, for paring and hoeing, moveable at pleasure, ...	100s.	to 6	0 0
Potato lifting Plough, with shifting grid, ...		5	15 0
Spades of sorts for ditching, &c., ...		0	4 0
Lime Shovels, of sorts, ...		0	4 0
Hand Hoes, of sorts, with handles, ...	1s. 6d.	to 0	2 0
Dung Forks, with do., ...	3s. 0d.	to 0	4 0
Pick Axes and Mattocks, with do., ...	5s. 0d.	to 0	6 0
Spade and Fork Handles, ...	1s. 0d.	to 0	1 6
Scotch Farm Cart, ...	200s.	to 12	0 0
Wings for do., ...	15s. 0d.	to 1	1 0
Iron Clips for pulling out land-stones, ...	22s. 6d.	to 1	10 0
Implement for lifting turnips in frosty weather, ...		0	3 6

£ s. d.

2. FOR DRAINING.

First, or Surface Spade for Drains,	.	.	.	0	4	0
Second, or Narrow, do. for do.,	.	.	.	0	4	9
Third, or Narrowest, do., used only for Wedge Draining,	.	.	.	0	4	0
Scoops, for cleaning out the bottoms of Drains,	3s. 9d. to	0	4	0	0	0
Pick, used where stones abound,	4s. 6d. to	0	5	6	0	0
Set for the small stone Drain (1st and 2d Spades and a Scoop),	.	.	.	0	13	0
Do. for do., where a pick is required (1st and 2d spades and a Scoop, with a Pick and large Scoop for throwing out the loosened earth,)	.	.	.	1	2	6
Set for the Tile Drain (1st and 2d Spades and a flat Scoop),	.	.	.	0	13	0
Do. for the Wedge Drain, (1st, 2d, and 3d Spades, and a narrow Scoop),	.	.	.	6	16	6
Harp Shovel, for separating the earth and rubbish from the small stones in filling the Drain,	.	.	.	0	5	6
Harp Machine, mounted on 3 wheels, used for the same purpose as the Harp Shovel,	100s. to	6	0	0	0	0
Spade, for cutting Drain Tiles of Peat,	7s. to	0	7	6	0	0
Drain Tile Implement for making two soles at once,	.	.	.	0	6	6
Moulds for making the Concrete Tile, invented by Lord James Hay,	30s. to 40s.					
Drainers' Clogs, per pair,	4s. to	0	6	0	0	0
Do. Tramps to preserve the Shoe,	.	.	.	0	2	0
Sectional Models of Drains, most approved varieties,	8s. to	0	10	0	0	0

3. FOR SOWING.

Broad Cast Sowing Machine, for grain and grass seeds, drawn by one horse, sows about 24 acres per day,	.	.	12	0	0
Drill Sowing Machine, for 2 drills,	.	.	5	0	0
Do. do. for 3 drills,	.	.	6	0	0
Do. do. for 5 drills,	.	£8, 10s. to	10	10	0
Do. do. for 6 drills,	.	£10, to	12	0	0
Do. do., for beans, 2 drills,	.	.	5	0	0
Do. do., do. 1 drill,	.	.	1	10	0
Plough Seed and Manure Sower, as improved, and used by Mr Murray of Polmaise. Is attached betwixt the stilts of the Plough, and sows in the furrows—much approved,	.	.	1	8	0
Turnip Sowing Machines, for 2 drills,	.	120s. to	7	10	0
Do. do., with Bone-dust apparatus,	.	120s. to	12	0	0
Do. do., for 1 drill, seed alone, from 25s. to	.	.	2	0	0
Sidey's Turnip and Manure Drop Drill,	.	.	8	10	0
Turnip Hand Sower,	.	.	0	2	6
Sowing Baskets of sorts, for one or both hands,	.	.	0	4	6
Corn Skeps, or Straw Baskets, for carrying corn,	.	.	0	2	6

4. FOR REAPING AND GATHERING THE CROP.

Smith's Reaping Machine—acts with revolving cutters; propelled by two horses; cuts down from 8 to 10 imperial acres per day,	50	0	0
Drummond's Reaping Scythe, iron-handled. One man with this Scythe will cut down from 1½ to 2 imperial acres per day. The corn may be cut out from the standing crop, when not very much lodged, otherwise cutting in is better, though some prefer cutting in at all times. When the rake is taken off, it is equally adapted for hay cutting,	0	11	6
Scythe Hooks of sorts,	1s. to	0	1 9
Teethed Sickles, of sorts,	6d. to	0	0 8
Harvest Gloves, (per pair),	8d. to	0	1 0
Scythe Blades, patent and labelled,	3s. 6d. to	0	4 6

	£	s.	d.
Scythe Handles, or Sneds, wooden, ...	1s. 6d. to	0	2 6
Scythe Handles, or Sneds, iron, ...	3s. 6d. to	0	5 0
Scythe Stones and Strakes, ...	3d. to	0	0 6
Sheep Shears, ...	2s. 0d. to	0	3 0
American Hay or Stubble Rake, with straight wooden teeth, drawn by one horse, very effective, ...	40s. to	2	10 0
Stubble Rake, with curved iron teeth, drawn by one horse, is much approved in East Lothian and Berwickshire, 70s. to		5	0 0
Do. do. with curved iron teeth, drawn by the hand, 15s. to		1	5 0
Do. do. with wheels, ...		1	12 0
Hand Hay Rakes, ...	1s. to	0	1 6
Hay Forks, ...	2s. to	0	3 6
Potato Forks, ...	1s. 8d. to	0	2 0
Split Baskets, for carrying potatoes, very durable, ...		0	1 6
Parkhead Improved Cart for "Leading in" Grain off the Field, £10 to		12	0 0

5. IMPLEMENTS OF THE BARN.

Thrashing Machines for two to six horses.—The machinery of these are not kept on hand, but are furnished to order from the best makers, ...				£40 to	80	0	0
Flails, ...	2s. 6d. to	0	3	0			
Winnowing Machines or Fanners, with Riddles and Sieves, ...	160s. to	9	9	0			
Do. do., of various sorts and sizes, ...	80s. to	9	0	0			
Riddles and Sieves, wooden, ...	2s. 6d. to	0	3	0			
Do. do., of iron wire, ...	3s. to	0	4	0			
Barley Hummeller, for attaching to a thrashing machine, ...		6	0	0			
Do. do., for the hand, ...		0	6	0			
Imperial Measures for grain, (bushel, peck and lippie), ...		0	18	0			
Do. Bushel Measure, ...		0	10	0			
Corn Sack or Bags for 4 to 6 bushels, ...	1s. 9d. to	0	2	6			
Cloth for do. per yard, ...	7½d. to	0	0	9			
Hemp Ropes, ...	per lb. 5d. to	0	0	8			
Truck or Barrow for carrying sacks of grain, ...	15s. to	1	0	0			
Muirhead's Weighing Machine for 1 lb. to 5 cwt.		2	10	0			
Gart Steelyard, of sizes to weigh from 1 oz. to 12 cwt.	70s. to	6	6	0			
Do. do., for cart loads, &c.	280s. to	16	16	0			
These Steelyards were invented by Mr Davidson, Edin- burgh, and are considered of great value from their minute accuracy and portability, as they can be easily moved about wherever wanted.							
Weighing Implements of various construction, for weighing from 1 oz. to 200 lb.				10s. to	1	1	0
Machines for twisting straw ropes—twisting three at a time, 20s. to					2	10	0
Straw Rope Twister, of iron, ...		0	1	6			
Stack Pillars, of cast iron, ...	3s. to	0	4	0			
Wooden Shovels for granaries, ...	2s. to	0	5	0			
Sparred Potato Shovels for turning or filling up potatoes, allow- ing any earth or rubbish to escape, ...		0	4	0			
Split Hardwood Baskets, various sizes, ...	1s. 3d. to	0	3	6			

6. FOR PREPARING THE FOOD OF HORSES AND CATTLE.

Straw and Hay Cutting Machines, of sorts, ...	120s. to	8	10	0
Wrought by a man and a boy; cuts into lengths of about half an inch, from 1 to 1½ cwt. in an hour.				
Straw Cutting Knife, for working in a trough, ...	30s. to	2	0	0
Corn Bruisers. Wrought by one man, bruises 4 bushels in an hour; effects a saving of about 25 per cent.	160s. to	9	0	0

		£	s.	d.
Turnip and Potato Slicers, of sorts,	60s. to	7	0	0
Gardner's Patent Turnip Cutting Machine, well adapted for sheep and young stock,		6	0	0
Turnip Cutting Spade, quarters the root with one stroke,	8s. to	0	10	0
Hay Knives, of sorts,	2s. 6d. to	0	3	0
Potato Washing Machines,	60s. to	4	0	0
Potato Washing Basket,		0	4	0
Horse Corn Sieves, of wood,		0	2	6
Do. do., of wire,	5s. to	0	5	6
Steaming Apparatus, for steaming the food of horses, &c.	200s. to	15	0	0
Farm Boilers, of malleable iron,	90s. to	5	10	0
Do. do., of cast iron,	20s. to	2	0	0
Machine for bruising Oil Cake,	£3 to	3	10	0

7. UTENSILS OF THE DAIRY.

Milk Pails, of sorts,	2s. to	0	3	0
Milk Sieves of hair or wire,	10d. to	0	2	6
Do. do. of perforated zinc,	1s. 6d. to	0	2	6
Milk Coolers of wood and tin,	2s. 6d. to	0	4	0
Do. do. of zinc,	3s. to	0	4	0
Do. do. large leaden, for extensive dairies,	40s. to	3	0	0
Zinc Apparatus for increasing the butter in churning,	15s. to	1	5	0
Plunge Churns, of sizes,	10s. to	0	18	0
Oval Churn, sizes from 5 to 30 gallons, is now much approved of as by far the best for a dairy of one to ten cows,	24s. to	2	5	0
Cheese Knives, as used in Ayrshire,	8s. to	0	12	0
Curd Breaking Machine, for skim milk cheeses,		1	5	0
Chessarts, or Cheese Moulds,	2s. 6d. to	0	4	0
Cheese Press, wrought by a screw,		0	18	0
Ayrshire Cheese Press, much approved for giving continued equable pressure,	50s. to	3	15	0
Thermometers,	4s. to	0	5	0
Bisset's new machine for salting and refining butter, most use- ful in large dairies, or for butter merchants,	140s. to	9	9	0

8. MISCELLANEOUS.

Cattle Stomach Pump,		3	3	0
Steel Probes, used for cattle hoven at the stall,	3s. to	0	4	0
Enema Syringe for cattle,		0	5	0
Probang or Turnip Rammer, the most improved,		0	7	0
Spring Phleme, of safe and easy operation,	10s. to	0	12	0
Rings for leading Bulls or refractory cattle,	4s. to	0	5	6
Wire Gauze Lanterns, very safe in stable or barn,	5s. to	0	6	6
Measuring Chains,	10s. 6d. to	0	13	0
Do. Tapes,	4s. 6d. to	0	6	0
Dynamometer for measuring the force exerted in drawing the plough, &c.	35s. to	2	10	0
Corn Balance, for giving the weight per bushel from a grain sample,	15s. to	2	2	0
Salter's Circular Spring Balance for weighing pounds by ounce or half ounce divisions, sizes, from	15s. to	1	10	0
Paling Nails, (per 1000),		0	5	0
Paling Mallets, of sorts,	8s. to	0	10	0
Greig's Vermin Traps, of sizes,	3s. 6d. to	0	4	0
Mole Traps, of sorts,	1s. to	0	2	0
Sawing Machine, for cutting logs of firewood, &c. 2 sorts,	30s. to	2	3	0
Road Scraping Machine,		3	15	0

	£	s.	d.
Road Hoes, handled,	0	4	6
Do. Rakes, do.	0	4	6
Do. Hammers, per set of three,	0	9	0
Bar and Chain for binding cattle at the stall,	0	4	6
Common do. do. do.	0	1	0
Archer's Road Maker's and Drainer's Sector,	10s. to	0	15 0
Cart Harness, per set, complete,	60s. to	5	10 0
Plough Harness, complete for two horses,	56s. to	3	0 0
Pheasant Feeders,	20s. to	1	5 0
Improved Poultry Feeders,	40s. to	5	10 0
Improved Sheep Racks,	80s. to	4	10 0
Perforated Zinc for dairy windows,			
Rain Gauge of zinc,		0	10 6
Pigs' Trough, cast iron, with folding leaf,	70s. to	4	10 0
Hay Racks for Stables, cast iron,		0	10 0
Mangers for do., cast iron,	20s. to	1	5 0
Pillars for do., cast iron,	20s. to	1	9 0
Improved Park Gate Latchet,		0	4 0
Nets for enclosing Sheep when feeding off Turnip,			
	per yard,	5d. to	0 0 7
	per lb,	7d. to	0 0 8
Tarred Rope for do.,		10s. to	0 15 0
Models in Straw of Corn Stacks,		10d. to	0 1 4
Mats for Packing,			

HORTICULTURE AND ARBORICULTURE.

GARDEN AND FOREST IMPLEMENTS AND UTENSILS.

1. FOR OPERATIONS ON THE SOIL.

	s.	d.
Digging Spades,	3s. 6d. to	4 6
Flower do.,	2s. to	3 6
Shovels,	3s. 6d. to	4 6
Rakes,	1s. to	3 0
Murray's Drill Rake, wooden,	4	6
Do. of iron,	10	0
Lawn Rakes,	8	6
Garden Reels,	2	6
Lines for do.	1s. to	1 6
Dibbles, of sorts,	1s. to	2 0
Hoes, Dutch or Thrust,	1s. to	2 0
Do. Draw,	6d. to	1 6
Do. Lord Vernon's,	4	0
Weeding Trowels,	1s. to	1 3
Transplanting do.	1s. to	1 6
Bulb Lifters,	1	6
Weed Hooks,	1	0
Dock Spades,	3	6
Forest Planting Spades,	3s. to	4 0
Planters of sorts,	2s. to	3 0

2. FOR PRUNING AND TRIMMING.

Pruning Knives, of sorts,	1s. 6d. to	3 0
Grafting and budding, do.	2	0
Pruning Scissors,	2s. to	3 0
Saws,	3s. to	6 0
Chisels,	1s. to	1 6

Pruning Hatchets,	1s. 6d. to	3 6
London's Hatchet with hammer attached,	2s. 9d. to	9 0
Hedge Bills, of sorts,	3s. to	6 0
Switchers,	3s. 6d. to	5 0
Hedge Shears,	4s. 6d. to	7 6
Scraper for cleaning trees,	7	6
Forest Pruners,	6s. to	10 0
Pruning and Hedge Gloves		
per pair,	1s. to	5 0
Budding's Mowing Machine,	180	0
Scythe Blades,	3s. 6d. to	4 0
Handles, wooden		
	1s. 6d. to	2 6
iron,		
	3s. 6d. to	4 6
Stones, & Strakes,	3d. to	0 6
Grass Edging Shears,	7s. to	9 0
Nail Hammers,	1s. 3d. to	1 6
Nail Bags,		3 0
Nails for Walls, per 1000,		6 0
Do. cast-iron, per 1000,		3 0
Rope Yarn, per lb.	6d. to	0 8
Cloth Rounds, per lb.		1 0
Metallic Wire for tying plants, per lb.	10d. to	2 0

3. MISCELLANEOUS.

Wheelbarrows, sorts,	18s. to	24 0
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	s	d		s	d
Garden Engine for watering,			Wire Fence, of sorts, per		
120s. to 140	0		running yard,	1s. to 4	0
Scott's Patent Garden Pump,			Wire Stretchers used in erect-		
very superior and effec-			ing Wire Fence, 35s. to 40	0	
tive,	50	0	Tallies for Plants, of sorts.		
Alfred Green's double			Wire Trainers for Plants, of sorts.		
action, do.	30s. to 35	0	Sea Kale Pots, 1s. 6d. to 2	0	
Wooden Dutch Pump, 6s. to 7	0		Mats for Hotbeds, &c.	1	2
Syringes and Squirts, 5s. to 20	0		Thermometers, 4s. to 7	0	
Fumigating Bellows, 25	0		Nets for Wall Trees, each		
Sulphur Puffs, 5	0		1s. 6d. to 12	0	
Flower Pots, 3 to 6 inches			Garden Chairs, iron, 30s. to 50	0	
diameter, per dozen, 8d. to 1	8		Rustic do. 15s. to 60	0	
Do. do. 6 to 9 inches do. per			Portable seats, of sorts, 5s. to 4	0	
dozen, 2s. 6d. to 5	0		Horticultural Tool Chest, 65	0	
Do. do. ornamental, each 6d. to 6	0		Flower plot edging, cast iron,		
Vases, of sorts, 10s. to 200	0		per yard, 3	6	
Flower Root Glasses, 1s. to 1	6		Peas Stob, cast iron, 3	6	
Bell Glasses, 1s. 6d. to 2	0		Sun Dials, 60s. to 160	0	
Hand-Glass Frames, glazed,			Flower Stands of wood and of		
10s. to 14	0		iron, 10s. to 40	0	
Do. unglazed, 6s. to 8	0				

GARDEN SEEDS.

	s	d		s	d
1. LEGUMINOUS.			Onion Portugal,	0	6
Peas, Early Racehorse, per lb.	0	6	Silver Skinned,	0	6
Do. Rising Sun,	0	5	Welsh, &c.	0	5
Do. May,	0	5	Leek, Scotch,	0	6
Do. Warwick,	0	5	Flag,	0	6
Do. Frame,	0	5	Garlic (roots,) per lb.	2	0
Do. Charlton,	0	4	Shallot, (do.)	2	0
Do. Bishop's Dwarf,	0	6	3. BRASSICA OR CABBAGE TRIBE.		
Dwarf Marrow,	0	4	Cabbage, Early Dwarf, per oz.	0	4
Tall Marrow,	0	4	Common Early York,	0	4
Woodford's Green do.,	0	5	Large do. do.,	0	6
Knight's Dwarf do.,	1	0	Peacock's Early,	0	6
Knight's Tall do.,	1	0	Sugar Loaf,	0	6
Adelaide,	0	6	Battersea,	0	6
Blue Prussian,	0	4	Drumhead,	0	4
Imperial Dwarf,	0	4	Red Dutch,	0	6
Royal do.	0	5	Cauliflower, Early and Late,	2	6
And other varieties.			Brocoli, Early Purple,	1	0
Beans, early Mazagan,	0	6	Sulphur,	1	0
Do. Lisbon,	0	4	White,	1	0
Do. Longpod,	0	4	Imperial Winter,	1	0
Windsor, &c.,	0	4	Grange's Early,	1	6
Kidney Beans, Speckled, of			New Dwarf Russian,	1	6
sorts,	1	6	Brussels Sprouts,	0	6
White,	1	6	Savoys, Green Curled,	0	4
Negro,	1	6	Yellow, do.,	0	6
2. ALLIACEOUS.			Globe,	0	6
Onion Strasburgh, per oz.	0	4	Greens, German Curled,	0	3
Deptford,	0	5	Red,	0	3
Blood Red,	0	6	Delaware,	0	6
Globe,	0	6	4. ESCULENT ROOTS.		
Tripoli,	0	8	Turnip, Early White Dutch,	0	3
James's Keeping,	0	6	Liverpool Yellow,	0	3

	s.	d.		s.	d.
Turnip, Yellow Dutch,	0	3	Lettuce, Green Cos.,	1	0
Yellow Malta,	0	4	Bath Cos.	1	6
Yellow Stone,	0	3	Imperial do.	1	0
White, do.,	0	3	Tennis Ball,	1	6
Carrot, Early Horn,	0	3	Drumhead,	1	0
Long Red,	0	2	Brown Dutch,	1	0
Altringham,	0	2	Silesian, &c.	1	0
Orange,	0	2	Celery, Red Solid,	1	0
Parsnip Hollow Crowned,	0	3	White do.	1	0
Jersey,	0	3	Large Manchester,	1	0
Beet, Red,	0	4	Endive, White Curled,	1	0
Red Bath,	0	4	Green Curled,	1	0
Yellow,	0	4	Batavian,	1	0
Turnip Rooted,	0	4	Cress, Curled,	0	2
White,	0	4	Hardy Golden,	0	6
Scorzonera,	1	0	American,	0	6
Salsafy,	1	0	Mustard, White, per lb.,	1	0
Skirret,	1	6	Parsley, Curled, per oz.,	0	3
			Triple Curled,	0	4
5. SALLADS, &c.			Spinage, Round, per lb.,	1	4
Radish, Early Frame,	0	2	Prickly,	1	4
Early Short-top,	0	2	New Zealand, per oz.	1	0
Salmon,	0	2	Sea Kale,	0	6
Scarlet,	0	2	Asparagus,	0	6
Black Spanish,	0	2	Melon, per dr.,	0	6
Red Turnip,	0	3	Cucumber,	0	4
White Do.	0	3	Vegetable Marrow, per oz.,	2	6
Lettuce, White Cos.,	1	0	Gourds,	2	0

SWEET AND POT HERBS.

	s.	d.		s.	d.
Basil, per oz.,	1	0	Hyssop,	1	6
Balm,	1	6	Lavender,	2	0
Borage,	1	6	Marjoram,	1	6
Clary,	1	0	Marygold,	1	6
Fennel,	1	0	Rosemary,	2	0
Thyme,	1	0	Savory, Winter,	1	0
Sage,	2	0	Summer,	1	0

KITCHEN PLANTS AND ROOTS.

	s.	d.		s.	d.
Cabbage, of sorts, per 100, 6d. to	1	0	Artichokes, Common,	2	6
Greens,	0	3	Sweet and Pot Herbs, 2s. to	3	0
Cauliflower,	2s. 6d. to	5 0	Early Potatoes, per bus. 3s. to	4	0
Brocoli,	1	0	Ash-leaved Kidney,		
Asparagus,	2	6	Ash-leaved, round,		
Sea Kale, per doz.,	1	0	Ross's Improved,		
Tart Rhubarb,	4	0	Fortyfold,		
Horse Radish,	1	6	London,		
Artichokes, Jerusalem,	0	6	Mushroom Spawn, per bush.	10	0

FLOWER SEEDS.

TENDER ANNUALS	s.	d.	HARDY ANNUALS.	s.	d.
Amaranthus, per dr.	0	6	China Asters, finest sorts,		
Balsam, Double,	0	6	per dr.	0	2
Capsicum, of sorts,	0	6	Chrysanthemum, sorts,	0	2
Cockscomb,	0	9	Convolvulus, Major,	0	2
Egg Plant,	0	9	Do. Minor,	0	2
Ice Plant,	0	6	Clarkia, sorts,	0	3
Sensitive Plant,	1	0	Coreopsis elegans,	0	3

	s.	d.		s.	d.
Colinsia bicolor, .	0	3	BIENNIALS AND PERENNIALS.		
Clintonia pulchella, .	0	3	Auricula, per dr.	1s. 6d. to	2 6
Collomia coccinea, .	0	3	Campanula, of sorts,		0 2
Gypsophylla elegans, .	0	3	Carnation, .		0 6
Larkspurs, of sorts, .	0	2	Escholtzia, of sorts, .		0 3
Lupines, per oz., .	0	4	Fraxinella, .		0 2
Love lies Bleeding, per dr.,	0	2	French Honeysuckle,		0 2
Mignonette, per oz., .	0	9	Hollyhocks, fine double,		0 2
Marygold, fine sorts, per oz.,	1	6	Mimulus, of sorts,		2 6
Nasturtium, of sorts, per oz.,	0	6	Pansies, fine sorts,		1 6
Nemophilla, insignis, per dr.,	0	6	Pinks, .		0 6
Oenothera, of sorts, .	0	2	Polyanthus, .		0 9
Poppy, .	0	2	Snapdragon, .		0 3
Princes Feather, .	0	2	Sweet William, .		0 2
Rhodanthe Manglesii,			Stocks, Brompton, of sorts,		0 3
Sweet Peas, per oz., .	0	4	Scabious Sweet, .		0 3
Sun Flower, per dr., .	0	2	Wallflower, .		0 2
Schizanthus, .	0	6	Valerian, .		0 2
Ten-week Stock, fine sorts,	0	2	And many other varieties.		
Tobacco, &c., .	0	2			

FLOWER ROOTS.

	s.	d.		s.	d.
Anemones, named, per doz.	4	0	Double Cistus, of sorts,	0	9
Do. mixed, .	1	0	Escholtzia, of sorts, .	0	6
Ranunculus, named, .	3	0	Lupines, .	0	9
Do. mixed, .	1	0	Mimulus, new sorts, .	0	9
Tulips, named, .	9s. to 18	0	Potentilla, .	0	9
Do. mixed, .	3	0	Pansies, .	6d. to	3 0
Hyacinths, named, .	9s. to 18	0	Peonias, .	6d. to	1 0
Do. mixed, .	6	0	Phlox, .	6d. to	1 0
Polyanthus Narcissus,	6	0	Rocket, Double White,		0 9
Jonquils, double, .	6	0	Virginian Cowslip, .		0 9
Lilies, White, .	6	0	Verbenas, sorts, .		1 6
Do. Martagon, .	6	0			
Crocus, .	0	6	Wallflower, Double, .	0	6
Snow Drop, double, .	0	6	Carnations, named, per pair,	2	0
HERBACEOUS.			Pinks, named, .	1	0
Antirrhinum, new striped, each	1	0	Auricula, named, each,	2	6
Calceolarias, fine sorts, 1s. to 3	0	0	Polyanthus, named, each,	1	6

GREEN-HOUSE PLANTS.

	s.	d.		s.	d.
Pelargoniums, each, .	1s. to	2 0	Salvias, .		1 0
Fuchsias, .	1s. to	5 0	Heliotrope, .		1 0
Hydrangeas, .		1 0	Verbena, of sorts,		1 0
Myrtles, .	1s. to	2 0	Camellias, .	4s. to	7 6
Cactus, of sorts, .		1 6	Acacia armata, .		1 6
Chinese Roses, .	1s. to	2 0	Azalea Indica, &c., .		3 0

SHRUBS.

	s.	d.		s.	d.
Arbutus, of sorts, each,	1	0	Andromeda, sorts, .	1s. to	2 0
Arboretvitæ, American,	0	4	Azalea Pontica, .		1 0
Chinese, .	1	0	of sorts, 1s. 6d. to		2 6
Alaternus, of sorts, .	1	0	Almond, Double, .		2 0
Aucuba, Japonica, .	1	0	Cherry, Double, .		1 6

	s.	d.		s.	d.
Berberry, Common, .	0	4	Lilac, Common, .	0	6
Evergreen, 9d. to	1	6	Persian, .	0	4
Bay Sweet, .	1	0	Ledum, of sorts, each, .	1	6
Box Tree, of sorts, .	0	6	Mezereon, .	0	6
Broom White, &c., .	0	6	Pyrus Japonica, .	0	9
Clethra, of sorts, .	1	0	Rhododendron Ponticum, 6d. to	1	0
Cedar, Red and White, .	0	6	maximum, .	2	0
Cistus, of sorts, .	1	0	of sorts, 1s. 2	6	
Cypress, Upright, (in pots)	1	0	Rose, double Ayrshire, of sorts, .	0	6
Deciduous, .	1	0	Do. Scotch, .	0	6
Clematis, of sorts, 6d. to	1	0	Fine sorts, named, 6s.		
Daphne, .	1s. to	2 0	per doz. 6d. to	1	0
Erica, of sorts, .	0	9	mixed, 4s. per doz., .	0	6
Guelder Rose, Double, .	0	6	Chinese, bluish, .	0	6
Holly, Striped sorts, .	1	0	of sorts, .	1s. to	2 0
Honeysuckle, of sorts, .	0	4	Ribes sanguineum, .	0	6
Jasmine, .	0	6	speciosum, .	1	6
Juniper, Swedish, .	0	6	Savin, sorts, .	0	6
Ivy, Irish, .	0	3	Snowberry, .	0	3
Kalmia latifolia, .	2	6	Spirea, of sorts, .	0	4
of sorts, 1s. to	1	6	Syringa, .	0	4
Laurel, Portugal, 1 foot, .			Sumach, .	0	6
12s. per 100, .	0	2	Thorn, Double, .	1	0
1½ feet, 18s. per 100, .	0	3	Scarlet, .	1	0
Common, 1 to 1½ feet, .			Whin, Irish, .	0	6
10s. per 100, .	0	2	Double, .	0	6
1 to 2 feet, .			Yew, Common, .	0	6
16s. per 100, .	0	3	Irish, .	1	0
Lauristinus, sorts, .	0	4			

FRUIT TREES AND BUSHES.

	s.	d.		s.	d.
Apples, dwarf and standard, .			Apricots, dwarf and standard, .		
9d. to	1	0	2s. to	4	0
Pears, do. do. 1s. to	1	3	Gooseberries, per doz. 2s. to	3	0
Cherries, do. do. 1s. to	1	6	new sorts, 6s. to	12	0
Plums, do. do. 1s. to	1	6	Currants, of sorts, 2s. 6d. to	3	0
Peaches, do. do. 2s. to	4	0	Raspberries, .	2s. to	3 0
Nectarines, do. do. 2s. to	4	0	Strawberries, per 100, 1s. 6d. to	3	0
Trained Trees, Dwarf, 2s. 6d. to 5s., Rider, 3s. 6d. to 7s. 6d.					

FOREST TREES.

SEEDLING.

PINE AND FIR TRIBE.	Per 1000.		HARDWOOD, &c.	Per 1000.	
	s.	d.		s.	d.
Larch, .	2 years,	2 6	Oak, .	2 years,	5 0
Scotch Fir, .		1 6	Ash, .		3 0
Norway Spruce, .		3 0	Elm, .		4 0
Black American, .	25	0	Plane or Sycamore, .		5 0
White do. .		6 0	Beech, .		4 0
Silver Fir, .		6 0	Birch, .		4 0
Weymouth Pine, .		8 0	Alder, .		4 0
Balm of Gilead, .		6 0	Chestnut, Spanish, .		12 0
			Horse, .		10 0

One year seedlings, of the above, are generally $\frac{1}{3}$ to $\frac{1}{4}$ lower in price.

TRANSPLANTED.

PINE AND FIR TRIBE.		Per 1000.		Per 1000.		
		s.	d.		s.	d.
Larch, 1½ to 2 feet,	10	0		Elm, 1½ to 2 feet,	15	0
Scotch Fir, 1 foot,	7	0		Plane, do.	15	0
Norway Spruce, do.	12	0		Birch, Weeping, do.	25	0
Black American, do.	60	0		Birch, Common, do.	20	0
White do. do.	15	0		Alder, do.	20	0
Silver Fir, do.	20	0		Chesnut, Spanish, do.	40	0
Weymouth Pine, do.	20	0		Horse, do.	30	0
Balm of Gilead, do.	20	0		Lime, 8 feet,	100	0
Pinaster, do.	20	0		Poplar Black Italian, do.	80	0
Pinus Cembra, 6d. each.				Lombardy, do.	40	0
Austriaca, or Black Pine				Hoary, do.	100	0
of Austria,	15	0		Ontario, do.	40	0
Pinus Montana, 3s. per 100.				Willow, Huntingdon, do.	25	0
Laricio, 10s. per do.				Walnut, do.	150	0
				Turkey Oak, do.	70	0
				Scarlet, do.	150	0
				Mountain Ash, do.	50	0
				Laburnum, 4 feet,	60	0
				Norway Maple, do.	60	0
				Purple Beech, 1s. each.		
HARDWOOD, &c.						
Oak, 1½ to 2 feet,	25	0				
Ash, do.	15	0				
Beech, do.	20	0				

PLANTS FOR HEDGES.

	<i>s.</i>	<i>d.</i>		<i>s.</i>	<i>d.</i>
Thorns, 1½ feet, per 1000,	10	0	Box Tree, 1 foot, per 100,	12	0
Beech, 1½ feet, .	15	0	Holly, 1 foot, .	4	0
Hornbeam, 1½ feet, .	20	0	Yew, 1 foot, .	10	0
Evergreen, Privet, 1½ feet,	20	0	Dwarf Box for edgings, 6d.		
Sweet Briar, do. .	25	0	per yard, 1 yard runs		
Portugal Laurel, 1 foot, per			about 3 yards of edging.		
100,	12	0			

MISCELLANEOUS ARTICLES.

	<i>s.</i>	<i>d.</i>		<i>s.</i>	<i>d.</i>
Canary for Birds, per lb.	8d.	to 0 4	Carolina Rice, per lb.	0 5	
Hemp. do. .	8d.	to 0 4	Superior Flour of Mustard,	1 8	
Rape, do. .	3d.	to 0 4	Split Peas, .	0 3	
Maw, do. .		1 0	Whole boiling do. .	0 2	
Bird Cages, each	1s. 9d.	to 10 0	Caraway, .	0 8	
Glasses, .	10d.	to 1 0	Coriander, .	0 5	

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Gardening, &c.*

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W. D. & SONS having had many applications on the subject of erecting the Wire Fences described and recommended in the Reports of their Agricultural Museum, have now the satisfaction of stating that they have made arrangements with a Firm, well qualified by extensive experience, to do every justice to the work.

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Strong Wire Fence, in wrought iron posts, and uprights, for Cattle and Sheep, 1s. 6d. per yard.

Ditto, for Horses, Cattle, and Sheep, 1s. 9d. per yard.

Ditto, for Horses, Cattle, Sheep, Hares, and Rabbits, 3s. 6d. to 3s. 9d. per yard.

Hare and Rabbit Fence, 2s. 3d. to 3s. per yard.

For enclosing Deer Parks this kind of Fencing is peculiarly adapted, and can be erected at from 2s. to 3s. 6d. per yard, according to height and strength.

For the temporary division of Grounds or Pasture Lands the best fence is the Wrought Iron Hurdle, which can be had at from 2s. to 3s. per yard, according to the strength.

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The grounds of any gentleman who may intend to make trial of any of the above Fences surveyed, and estimates given, without any charge.

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